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The Malaysian Dental Journal covers all aspects of work in Dentistry and supporting aspects of Medicine. Interaction with other disciplines is encouraged. The contents of the journal will include invited editorials, original scientific articles, case reports, technical innovations. A section on back to the basics which will contain articles covering basic sciences, book reviews, product review from time to time, letter to the editors and calendar of events. The mission is to promote and elevate the quality of patient care and to promote the advancement of practice, education and scientific research in Malaysia.

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Cover page: Pictures showing radiographs with broken bur pre- and post-operative and clinical pictures illustrating the region of paraesthesia and the site of surgery. Pictures courtesy of Professor Dr. Michael Ong Ah Hup; taken from the article "Removal of accidentally fractured diamond bur beneath the inferior alveolar canal".



EDITORIAL : WHAT IS THE ROLE OF MDJ IN PROMOTING RESEARCH AND PUBLICATION?

Several editorial members of the Malaysian Dental Journal Editorial Board were sponsored by the Malaysian Dental Association to attend the Workshop on Publishing for Biomedical Journal Editors and Reviewers: Publishing in a global competitive world organised by the Department of BioImaging, Faculty of Medicine, University of Malaya from July 15 to 15 2006. The 2 days event held at the Le Meridian Hotel, Kuala Lumpur was an eye-opener as the organizers were able to get key editors from the British Medical Journal, the Australian Medical Journal and the Canadian Medical Journal to share their experiences with the participants.

Among the aims of this workshop was to improve the skills of editors and reviewers, review the current status of biomedical journal publishing, assess the problems and constraints facing biomedical journals, develop guidelines for quality of biomedical journal publishing, promote a code of ethics for biomedical journal publishing, analyse trends in journal publishing, and promote collaboration and networking among editors of biomedical journals.

One of the issues raised by this workshop is the role of a biomedical (in our case, dental journals) in promoting research and science in the region concerned. On the same wavelength, readers may want to ask me what is the role of the MDJ in promoting research and publication in Malaysia and the South-east Asian region?

Well for a start, the MDJ aims to promote dental science and research in this region. We encourage contributions and it is the policy of the MDJ to try to mould inexperienced contributors into better authors by giving feedbacks. We normally do not reject contributions unless

the study has a major flaw. In cases of doubt, some manuscripts were reviewed by 3 independent referees, instead of the normal two. This process of course lengthen the time needed to get an article published; not withstanding the time for corrections to be made. We want to get the best out of the authors, and hopefully are able to share their experience and findings with the Malaysian dentists and academic community. As has been written in my first editorial, we have started a column on "The Expert says...." for that reason, i.e. to promote a learning theme even if the actual scientific research papers are not read by the general dental practitioners.

The unfortunate problem for us at the editorial board is not knowing what the readers want. Sadly, even though we have placed a questionnaire at the end of the Volume 26 No. 1 issue of the Malaysian Dental Journal, I have not received even 1 feedback. The good news is that the first thing I did when I took over the job of the editor of the Malaysian Dental Journal was to undertake a survey with my two undergraduate students. We hope the finding in this pilot survey will be ready by the next issue of the Malaysian Dental Journal.

Thank you.

Associate Professor Dr. Ngeow Wei Cheong
Editor,
Malaysian Dental Journal



Removal of Accidentally Fractured Diamond Bur Beneath the Inferior Alveolar Canal.

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ABSTRACT

The removal of mandibular wisdom teeth is a routine practice for many general practitioners and specialist oral and maxillofacial surgeons in Malaysia. The incidence of complications encountered is rarely reported in the local scene, might be due to the infrequent occurrence of it or lack of data collection and reporting by the operators. This paper will depict a rare case of an accidentally fractured diamond bur while attempting to remove a mandibular wisdom tooth. The problem has been rectified and ways to manage it are discussed. Though no long term complications are encountered, this experience is invaluable for us so that such situation can be avoided in the future.

Key words:

third molar surgery, wisdom tooth, bur, complication

INTRODUCTION

Surgical removal of impacted mandibular molars has been one of the commonest procedures performed by the oral and maxillofacial surgeons. In the National Health Service hospitals of United Kingdom, it accounts for about 90% of the surgeons' waiting list.¹ Generally, surgical removal of these teeth can be performed by the general dental practitioners (GDPs) or appropriately referred for specialist care. Most of the removals of impacted third molars were performed due to signs and symptoms such as recurrent pericoronitis, caries on the adjacent tooth and unrestorable cavity on the wisdom itself. The report below describes an unusual complication which happened during the removal of these teeth. Though it rarely happens, accidents do occur in the least expected way.

CASE REPORT

A 20-year-old Chinese man was referred to the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, University of Malaya, for the retrieval of a broken bur that happened during the surgical removal of a lower right impacted third molar. He had undergone an unsuccessful surgical removal of the wisdom tooth by a dental practitioner who tried to remove the impacted third molar by dividing it with a diamond bur under local

anaesthesia. The bur broke and got embedded near the nerve. Following a referral to the dental specialist in a private clinic, the impacted tooth was subsequently removed but an attempt to retrieve the broken bur near the inferior dental nerve resulted in the bur being embedded deep to the nerve. He was then referred for further management. His past medical and dental histories were not significant.

Clinical examination showed that there was numbness at the right lower lip region with slight limitation of mouth opening. The surgical site was noticed to be still numbed after removal of gauze packs that he was biting. When explored through the previously raised buccal flap, the surgical site showed that the tooth socket was only filled with blood clot as the divided tooth fragments had been removed.

The post-operative periapical radiograph showed the location of the bur which was displaced to the distal of tooth 47 and below the inferior dental canal. Further radiographs taken such as the dental panoramic tomograph and postero-anterior radiograph of the mandible (Fig 1, 2 & 3) confirmed a radiopaque object rectangular in shape and measuring about 1.0 x 4.0 mm and were observed deep in the socket of the wisdom tooth, about 2 mm below the ID canal.

An attempt was therefore made to remove this fractured bur by raising the same surgical flap under local anaesthesia. Surgical exploration was performed after



Figure1: An orthopantomogram shows the location of the fractured bur below the I.D. canal.

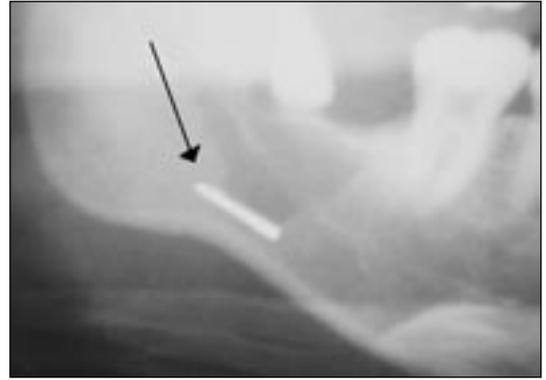


Figure 2: A close-up picture shows the osseous defect and the fractured bur which lies horizontally.

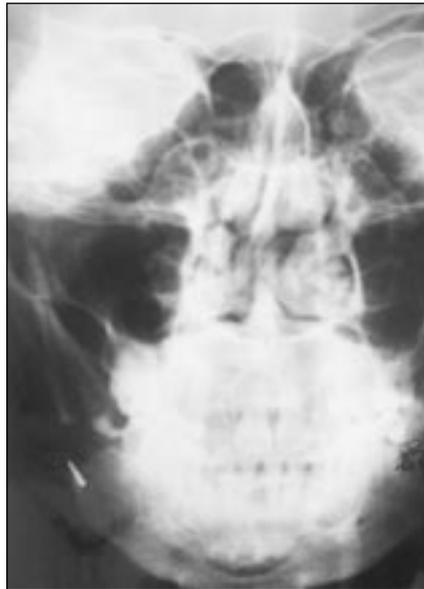


Figure 3: A postero-anterior skull radiograph which clearly defines the location of the foreign body at the inferior border of the mandible.



Figure 4: Intra-operative view of the surgical site.



Figure 5: Areas of paraesthesia present on the distribution of the right mental region.



Figure 6: Post-operative orthopantomogram radiograph.



Figure 7: The thin remaining bone on the inferior border of the mandible after the operation.



Figure 8: Review of the patient after nine months shows complete recovery of sensation of the affected side.

removing a buccal cortical bone plate of the mandible (Figure 4). Bleeding was controlled in order for the surgical site to be seen more clearly. The broken bur fragment was located deep to the inferior canal bundle.

The inferior dental nerve was then displaced slightly so that a fine hemostat could be used to grip the diamond bur fragment. The flap was closed with a resorbable suture material. Radiographic examination revealed a huge surgical defect below the neurovascular bundle (Figure 5 & 6). Medications were given. Patient was then reviewed about two weeks later, and the healing was found to be uneventful. However, slight paraesthesia persisted (Figure 7).

The patient was then given appointment for further follow-up every month. The paraesthesia was from the right anterior cheek region posteriorly to as far as the symphysis of the mandible anteriorly, with the inferior border of the mandible as its inferior limit. This could be due to some form of neuropraxia of the inferior alveolar nerve. By the fifth month, the patient could feel some pin-prick sensation and the region had already reduced in size (Figure 8). Total recovery of sensation was found by the ninth month post-operatively.

DISCUSSION

There are a number of complications which can happen while one performs minor surgical procedure on the lower wisdom teeth. Complications range from the common ones such as pain, inadequate numbness intra-operatively, excessive bleeding, trauma to the soft and hard tissues, swelling and infection, as well as not so common ones like, fracture of the adjacent structures, subcutaneous emphysema, dislodgment of tooth into the submandibular space, injury to the nerves and also fracture of the instruments.² The surgeon must take valid informed as well as written consent from the patient explaining those probable complications.

However, no matter how careful we try to avoid any complication, accidents do happen. In the current litigious scenario, even the best taken consent does not protect the performing surgeon from the legal and negligence claim of the patient. The indication to perform a minor surgical removal of the impacted wisdom teeth must be justifiable. The Faculty of Dental Surgery of the Royal College of Surgeons of England in 1997, had published a comprehensive national guideline regarding the indication for their removal and its management.³ Then, in March 2000, the National Institute for Clinical Excellence of United Kingdom, issued their guidance on the removal of the wisdom teeth, in the hope that only indicated teeth are to be removed.⁴ Therefore, the tendency for the surgeon being involved in the medico-legal cases would be minimised in such cases.

Besides that, the oral and maxillofacial surgeon must assess the degree of difficulty for the removal of the impacted wisdom teeth. On the radiograph, one will be

able to evaluate the tooth in relation to the surrounding structures. The classification by Pell and Gregory describes the tooth from the aspect of depth, the availability of horizontal space and also its spatial relationship.⁵ Depth is either in position A (high occlusal level), position B (medium occlusal level) or position C (deep occlusal level). The degree of space available between the distal surface of the second molar and the ascending ramus can be classified into class I (enough space, more than the crown width of the wisdom tooth), class II (reduced space) or class III (no space). Then, the spatial relationships are mesioangular, horizontal, vertical, distoangular and inverted. From these relations, Pederson described an ordinal scale for the degree of difficulty for the removal of impacted lower wisdom teeth.⁶ The root width also plays an important role in determining the easiness of the procedure, which can be either thin, bulbous or thick.⁷

Once all these factors are taken into consideration, steps are taken to avoid complications such as fractured bur during the procedure. Straight or contra-angled surgical handpiece can be used instead of the conventional high-speed handpiece. Foreign bodies such as burs, needles and elevator tips may fracture due to metal fatigue and application of excessive force during its use. Burs that are smaller than size 702 should not be used since they are easily broken.² Broken burs should be removed as soon as possible unless it is for the patients' best interest not to do so. If left in place, it can lead to cause foreign body and inflammatory reactions, and also progress to form a foreign body granuloma.²

While attempting to locate the fragment, it is beneficial to take two radiographs, each at an angle 90° to each other, in order to get a rough 3-dimension location of it.⁸ The feasibility of using such radiographs depends on the object's density, relative size and exact location within the tissue. In this case, since the object was radiopaque, the dental panoramic and the postero-anterior radiographs were utilized. This is the most common, easily available and cheaper method that provide a static image of an object.

Other more sophisticated methods such as using the plain and 3-D computerized tomography (CT) scan to pinpoint the exact location of a missing object located in the soft tissue.⁹ CT scan is considered as a gold standard for such procedures as it can provide about 70% detection rate.¹⁰ In this case, we thought it was not suitable due to high radiation and increase in cost.

Magnetic resonance imaging (MRI) can also be used in such cases, but due to its metallic compound, its use may lead to some metallic artifacts production from the object as well as risk of soft tissue injury due to effect of the magnetic field.¹⁰ Also the cost is considerably higher than other conventional techniques.

There are some cases whereby a buried metal object can be detected in the jaw by using an alarm-ringing electromagnetic metal detector.¹¹ Another way is to try the real-time ultrasonography for the localisation of non-static

object in the surgical site.¹² It uses a high frequency linear transducer which is placed on the skin surface to give an instant real-time image. Although it can give about 90% of success in detection rate, it requires an experienced examiner to interpret the results.¹⁰

Once the metal fragment can be localised, attempt to use simple instruments first, such as a tweezer, Kelly clamp or a curved hemostat. If the metal fragment is wedged between the bone, a bur can be used to drill a groove around it.¹³ Large surgical forceps can also be used to retrieve a dislodged tooth in other cases.

Many publications on complications of surgery on the impacted wisdom teeth are reported but few discussed the successful or even attempted treatment to overcome these complications. The present reported case of using a conventional treatment plan under local anaesthesia in solving an unusual intra-operative complication was performed without long-term complication. Thus, in order to avoid such incident from happening again, it is more feasible for the operator to use the conventional slow speed, straight or contra-angled surgical handpiece for such procedures, instead of the faster high speed handpiece.

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Patients' Perception of Healing After Surgical Removal of Mandibular Third Molar Under Local Anaesthesia.

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ABSTRACT

The aims of this study are to quantify patients' perception of healing after surgical removal of mandibular third molar, and the optimum days of sick leaves to be issued. Sixty patients who had been scheduled for removal of third molar were asked to enrol in this study conducted at the Oral Specialist Clinic, Sarawak General Hospital from June 2005 to August 2005. After surgery, each patient was given the post surgery diary, to be completed each postoperative day for 7 days. The survey form was designed to assess patient perception of recovery in 4 main areas namely the oral function, general activity, clinical symptoms and pain. These data provide dentists useful information in counselling patients about recovery after surgery.

Key words:

minor oral surgery, healing, perception, complication

INTRODUCTION

Surgical removal of lower third molars is one of the most common procedures carried out in the Oral Specialist Clinic, Sarawak General Hospital. Legally, consent should be signed before any surgical procedure. Today's patients are more educated and require a higher level of understanding before consenting to treatment. They want to know the duration of the surgery and what to expect during recovery. As healthcare develops toward a patient centered service it will become increasingly important not to ignore the patients' contribution to assessment of healthcare outcomes.¹ However, there is a lack of information being documented in Malaysia. The aims of this study are to quantify patients' perception of healing after surgical removal of mandibular third molars, and the optimum days of medical leaves to be issued.

MATERIALS AND METHOD

The Health-Related Quality of Life (HRQL) questionnaire designed by Conrad *et al.*² was modified for use in this study to measure the short-term outcomes of third molar removal surgery. The questionnaire was translated into the Malay language and was used in this study. (Appendix 1). Sixty patients who had been scheduled for removal of lower third molars were asked to enrol in this study conducted at the Oral Specialist Clinic, Sarawak General Hospital from June 2005 to August 2005. Inclusion criteria included age

between 15 and 44 years, no history of treatment for psychiatric illness, and American Society of Anesthesiology Physical Status Classification of 1 (no organic or psychiatric disturbance) or 2 (mild to moderate systemic disturbance). Baseline data included demographics (age, gender, race, and education level). The surgeon recorded a description of the surgery, including the type of impaction, and the duration of surgery in minutes. Discharge medications were standardised namely, amoxicillin 250mg three times a day, tds; ibuprofen 200mg tds, magnesium trisilicate 2 tabs tds for a week, and papase 2 tabs four times a day, qid for 4 days. If any of the patients were allergic to any of the above medication, they would be excluded. Surgery was performed by an oral surgery specialist and four other dental officers according to a standard surgical protocol that included local anesthesia, bone removal, tooth sectioning with rotary instruments, bone filing and suturing.

After surgery, each patient was given a post surgery diary, which included the revised HRQL survey to be completed each post-operative day for 7 days. The survey form was designed to assess patients' perception of recovery in 4 main areas namely oral function, general activity, clinical symptoms and pain. Oral function dealt specifically with mouth opening, chewing and talking. General activity measures the ability to participate in routine daily activities, recreation, sleeping and social interaction. Clinical symptoms included bleeding, bruising, swelling, food collecting in the surgical sites, halitosis, and nausea. Pain measures included worst pain and average pain in the form of 5-point Likert-type of

scale. Worst pain is defined as the worst pain the patient experienced in his/her mouth during the past 24 hours whereas an average pain is defined as average pain in the mouth throughout the past 24 hours. At the end of the 7 day period, the patients were instructed to return the completed diary and were reviewed.

RESULT

Fifty (n=50) of the 60 patients returned the completed post surgery diary. Eight (n=8) completed post surgery diary were rejected due to insufficient data e.g. incomplete post surgery diary. The clinical features were summarised in Table 1. The majority of cases were diagnosed as horizontal third molars (50%), followed by mesially angulated (35.7%). The mean surgical time was 34.6 ± 20 minutes. Figure 1, figure 2, figure 3 and figure 4 show the demographic data of the patients. The mean age of the patients was 26.7 ± 5.2 years old.

Type of impaction	No. of case	Mean surgical time (min)	Standard deviation (min)
Mesial angulated	15	34.33	17.6
Distal angulated	1	-	-
Horizontal	21	37.14	24.53
Vertical	5	25.00	5.00
Total	42		

Table 1. Clinical summary

Figure 5 shows the percentage of patients recording that oral function (eating, chewing, mouth opening, and talking) was impaired '*quite troublesome, very troublesome*' according to day after third molar surgery. On post operative day 1 (POD 1), chewing was most affected (21 patients) followed by mouth opening (20 patients) and eating (19 patients). Improvement in oral function was significant on POD 4, where less patients are affected when chewing (3 patients), mouth opening (1 patient), and eating (1 patient). Most of the patients showed marked improvement in oral functions on POD 4.

Figure 6 shows the percentage of patients recording that general activity (working, sleeping, socializing, and sports) was impaired '*quite troublesome, very troublesome*' according to day(s) after third molar surgery. Most of the patients showed good improvement in general activity on POD 4.

Figure 7 and 8 shows the percentage of patients recording that clinical symptom '*quite troublesome, very troublesome*' according to day after third molar surgery. The number of patients complaining of severe swelling and ecchymosis increased on POD 2. On POD 1, 13 patients complained of severe swelling which increased to 16 on POD 2. However, on POD 4, only two patients complained of having any severe symptoms.

On POD 1, in the severe pain category, 35.7% of patients rated the most severe pain during the past 24 hours as 4 or 5 whereas for the average pain category, 21.4% of patients rated 4 or 5. As shown on figure 9, from POD 4 onwards none of the patients rated the pain as 4 or 5 from both pain categories.

Figure 10 shows the mean number of days after third molar surgery for the entire groups of patients to record '*not troublesome, a little troublesome*' for symptoms and '*no pain, a little pain*' for worst and average pain according to the type of impaction. It can be noted that patients who undergo surgical removal of horizontally impacted mandibular third molars need more days for recovery. On average, it took 5 days for swelling to subside and the pain decreases gradually after 4 days. However these conditions did not affect their work because generally all the patients were fit to work on POD 4.

DISCUSSIONS

More than two-third (42) of 60 patients managed to complete the survey as instructed. Although Ibans formed the majority of the Sarawak population (30.1%) according to Department of Statistics 2000, most of the patients who undergo surgical removal of mandibular third molars in Oral Specialist Clinic, Sarawak General Hospital from June 2005 to August 2005 were Chinese (48%) because most of the Chinese lived in urban areas. Ninety three (93) percents of our patients received at least secondary education, so these patients understand the language used in the survey forms. Furthermore, in every session, prior to surgery, the questionnaires were explained to the patients and every enquiry was clarified.

This study found that 47.6% of the patients experienced severe difficulty in mouth opening on POD 1. This caused them to face problem in eating and chewing the food on POD 1. The main cause of difficulty in mouth opening is muscle spasm. Mandibular block injection and surgical procedures may cause inflammation of the muscles. Besides that, organisation of haematoma after passage of needle through medial pterygoid muscle during injection may also contribute to trismus. As a whole, the patients required 4 days for difficulty with mouth opening, chewing, and eating to reach minimal level. As a comparison to a study by Conrad,² his group of patients required 5 and 6 days for difficulty with mouth opening and chewing to reach minimal levels.

We found that peak time for swelling and ecchymosis being on POD 2. We shared the same clinical result as Conrad, where 61% of a total 201 patients experience peak swelling on POD 2.2 However, it resolved dramatically on POD 3. Almost twenty-four (23.8) percents of patients experienced severe bleeding POD 1. This might be due to the fact that, patients tended to rinse their mouth. The study showed that only 9.5% of patients complained of severe food impaction at the surgical site on POD 1. Nausea, food impaction and halitosis were not major problems for these patients.

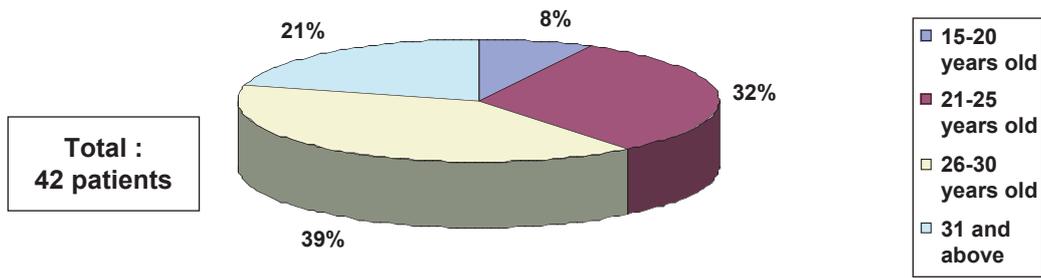


Figure 1. Age distribution

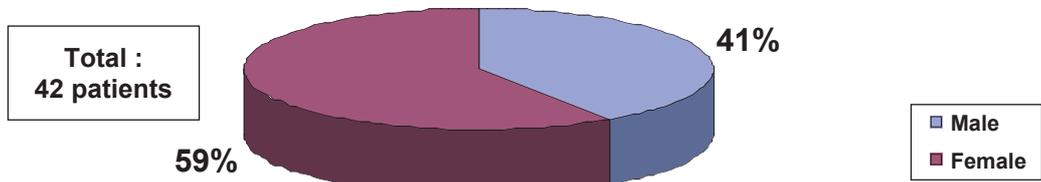


Figure 2. Gender distribution

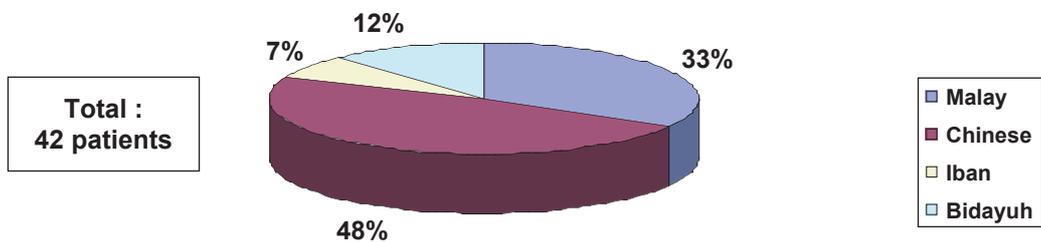


Figure 3. Ethnic distribution

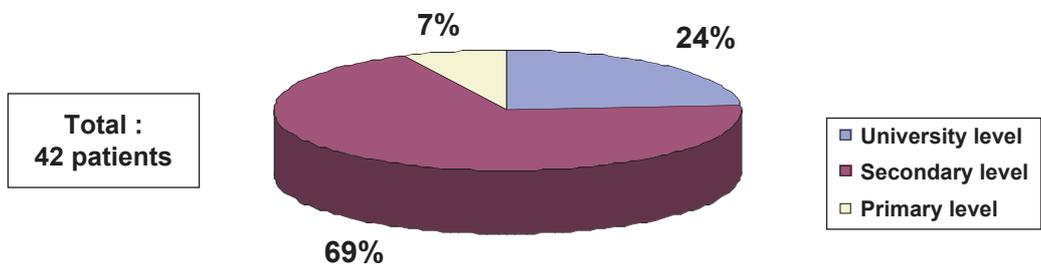


Figure 4. Education level

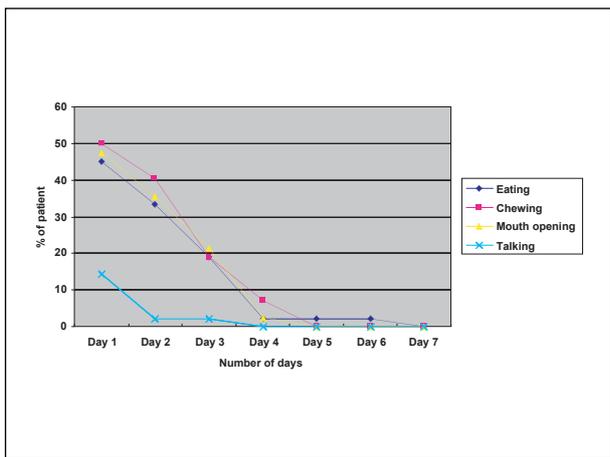


Figure 5. Percentage of patients recording that oral function (eating, chewing, mouth opening, and talking) was impaired ‘quite troublesome, very troublesome’ according to day after third molar surgery

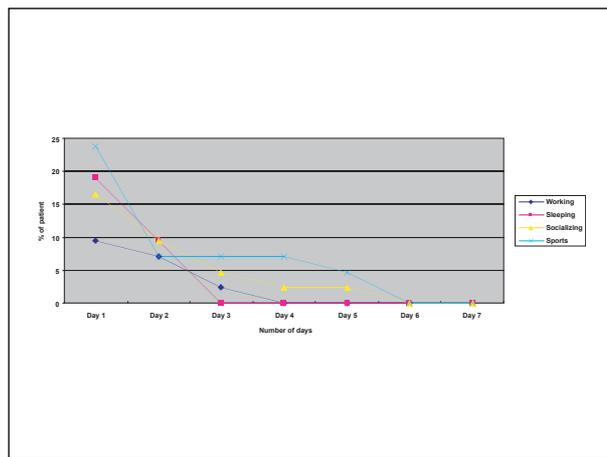


Figure 6. Percentage of patients recording that general activity (working, sleeping, socializing, and sports) was impaired ‘quite troublesome, very troublesome’ according to day after third molar surgery

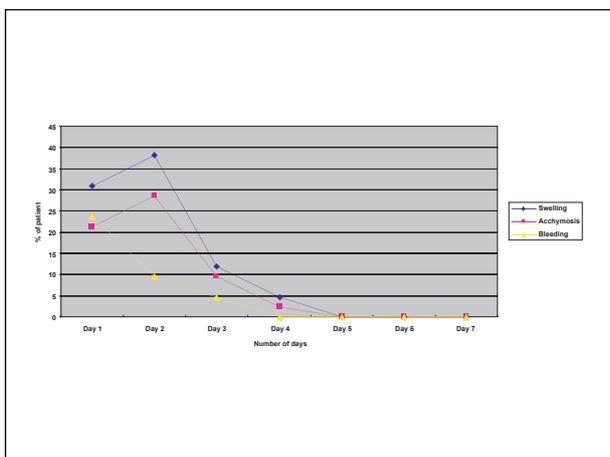


Figure 7. Percentage of patients recording that clinical symptom (swelling, ecchymosis and bleeding) ‘quite troublesome, very troublesome’ according to day after third molar surgery

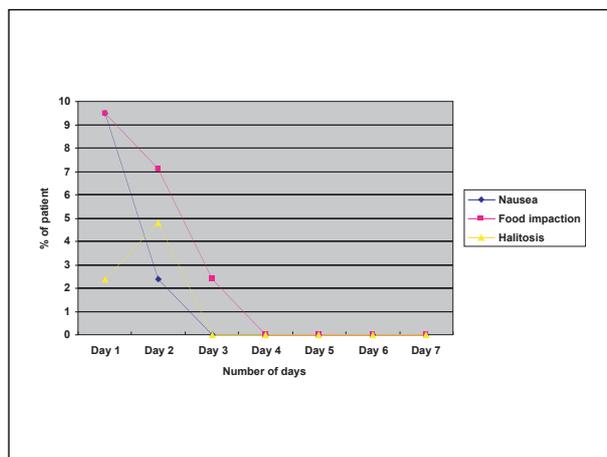


Figure 8. Percentage of patients recording that clinical symptom (nausea, food impaction and halitosis) ‘quite troublesome, very troublesome’ according to day after third molar surgery

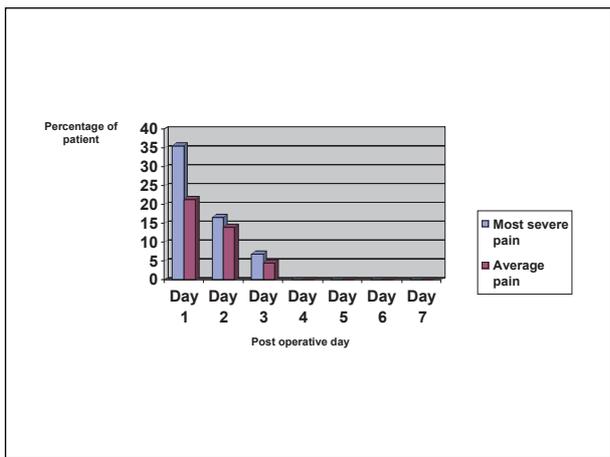


Figure 9. Percentage of patients recording worst pain (score 4, 5) and average pain (score 4, 5) according to day after surgery

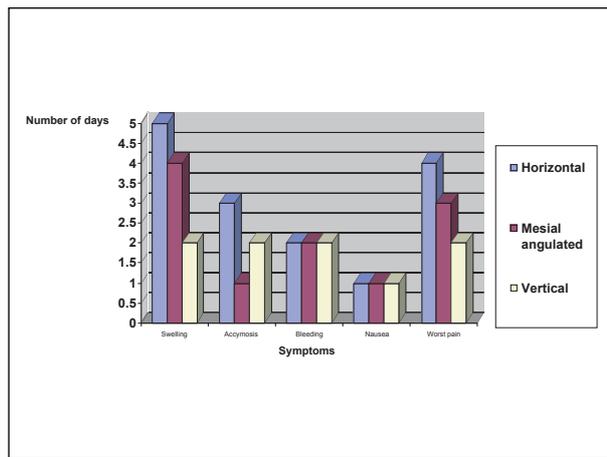


Figure 10. Mean number of days after third molar surgery for the entire groups of patients to record ‘not troublesome, a little troublesome’ for symptoms and ‘no pain, a little pain’ for worst and average pain according to the type of impaction

In our study, we found that 100% of patients were fit to work on POD 4. Van Gool *et al.* reported a mean period of 2.5 days in which patients were unable to work.³ Berge also reported that by POD 3, 90% patients could return to work.⁴ Therefore, we would like to propose that 3 days of medical leaves prescribed after surgical removal of mandibular third molars as sufficient. Clinical review on POD 4 should be carried out to determine whether medical leaves should be extended in difficult cases.

Only a quarter of the patients rated their average pain as '*quite troublesome, very troublesome*' on POD 1, and average pain levels diminished rapidly on the following days. The entire group required 4 days, to reach the point where pain was at a minimal level. Conrad² reported in his study that, it took 9 days for the entire group in his study to reach the point where pain was at a minimal level and females experienced prolonged recovery for pain measures. From this study we knew that majority of Chinese and Iban required less days of pain recovery as compared to the Caucasians. However, this should be interpreted with caution as the study was done solely in Oral Specialist Clinic, Sarawak General Hospital. Pain is a very subjective issue. There are lots of factors that contribute to prolonged recovery from pain. These include cultural experiences, personality, gender, type of analgesics prescribed, duration of surgery, difficulty of surgery, and prior symptoms related to the third molars.

This study showed that, horizontal impaction of lower third molar is the most difficult to remove. More bone must be removed for horizontally impacted third molars compared to other different anatomic positions. Therefore, recovery for most of the clinical symptoms was longer compared to others. According to Capuzzi, the post operative manifestations depend on a series of factors fundamentally related to the difficulty of the surgical procedure involved.⁵

From figure 10 we could make a conclusion that, patients who undergo surgical removal of horizontally impacted mandibular third molars need more days for recovery. On average, it took 5 days for swelling to subside and the pain decreases gradually after 4 days. However these conditions did not affect their work because generally all the patients were fit to work on POD 4.

The age of the patients play an important role in healing after surgical removal of third molar. More than seventy (71.4) percents of the patients in this study were below the age of 30. According to Ceib,⁶ increased age leads to more clinical problems after surgery including an increased incidence of localised osteitis and delayed wound healing.

CONCLUSION

The data in this study provide dentists with information on postoperative experiences. This is useful for patients' postoperative expectations. Furthermore, 3 days of medical leaves is sufficient for a patient recovering from post surgical trauma. Medical leaves will be only extended after clinical review on POD 4.

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Non-surgical Root Canal Retreatment of Multiple Teeth and The Removal of Fractured Instrument: A Case Report

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ABSTRACT

Root canal treatment failure may be related to several factors such as incomplete root canal debridement or defective root filling, presence of obstruction within the root canal which hinders sufficient root canal debridement and the quality of the final coronal restoration. The success rate quoted for both non-surgical retreatment and surgical retreatment range from 47% to 98%. This article describes a case report where multiple teeth which have had failed root canal treatment retreated successfully using conventional root canal treatment and a fractured instrument was successfully removed during instrumentation procedure.

Key words:

endodontics, root canal treatment, re-treatment, failure

INTRODUCTION

The biological rationale for endodontic treatment has been studied extensively. Orstavik and Pitt Ford in 1998 stated that the biologic aims of endodontic therapy are to prevent or cure apical periodontitis whilst the technical aims of root canal treatment are to clean, shape and three-dimensionally fill the root canal system.^{1,3 (should be no 1)} Root canal treatment can be among the most technically challenging tasks for dentists. Root canal treatments can and do fail. Salvaging these teeth will thus necessitate retreatment. Most studies on retreatments assess outcomes of surgical treatment with a limited number of studies specifically reviewing outcomes of non-surgical retreatment. Success rates for both non-surgical and surgical retreatment range from 45% to 98%.^{1,2,4,5} However the success rate is even lower for teeth associated with periapical lesions (62%-78%).^{4,6} Nevertheless, in cases where failure of treatment is as a result of technical or restorative reasons and where the periradicular tissues were not compromised, the success rate is much higher (93%-98%).^{4,6}

The success rate of root canal treatment is influenced by many factors such as the presence of pre-operative periapical lesion, the apical extent of root filling, the quality of the obturation, the presence of iatrogenic complications and the post-endodontic restoration.⁷ In retreatment cases, evidence in the literature suggests that wherever feasible i.e. when the root canal is coronally accessible and negotiable, the first option should be non-surgical treatment as this has a higher success rate than a surgical approach.⁸⁻¹⁰ Introduction of the operating microscope with corresponding advances in endodontic

instrumentation techniques has influenced the decision making process for retreatments as teeth previously treated surgically may now be treated non-surgically. Other factors to consider include the radiographic assessment of the technical quality of the root filling and the type of root filling material present, the presence and integrity of a cast restoration, the presence of resorptive lesions, perforations, blunderbuss roots, fractured instruments within the canal(s), a fracture root or a perio-endo lesion. Access for surgery and intra-coronal access to the problem area may be another important consideration.

CASE REPORT

A 33 year-old healthy female patient attended the Operative Dentistry Clinic for retreatment of the 41, 42, 44 and 45. At the time of presentation, the patient reported pain and sensitivity associated with the upper anterior teeth and dull aching pain associated with the 41 and 42. She has had active dental treatment for the last three years. Medical history was non-contributory and she was a regular dental attender. Clinical examination revealed good oral hygiene and healthy periodontal tissues. The 25 and 26 were restored with porcelain bonded to metal crown (PBM) and the 45 was an abutment for a 3-unit bridge. Radiographic examinations revealed both 41 and 42 had been previously root treated and there was a fractured instrument in the 41 and the root canal filling in 42 was short of the radiographic apex. There were periapical radiolucencies associated with both teeth (Figure 1). The 44 had a

radiopaque post and no radiopaque filling material present apical to the post. The 45 has been previously root treated with radiopaque filling material, which had large voids in the coronal region and was 8 mm short of the radiographic apex. Periapical radiolucencies associated with the 44 and 45 were present (Figure 2). A periapical radiograph of the 25 revealed that the tooth had been previously root-filled with a radiopaque material which was 6 mm short of the radiographic apex. There was a small periapical radiolucency associated with the root apex. The 26 had been previously root treated. However, only the palatal canal had been root-filled. There was a large periapical radiolucent lesion associated with the apex of the 26 (Figure 3). A provisional diagnosis of chronic periapical periodontitis associated with 25, 26, 41, 42, 44 and 45 was made.

The treatment options discussed with the patient were:

1. Non-surgical root canal re-treatment of the 25, 26, 44 and 45 if upon removal of the crowns the teeth were deemed restorable.
2. Non-surgical re-root canal treatment of the 41 and 42.
3. Surgical re-root canal treatment of the 41, 42, 44 and 45.

MANAGEMENT

The patient opted for the non-surgical root canal retreatment. The treatment protocols for all the teeth were as follows: After administration of local anaesthetic (2% Lignocaine and 1:80,000 adrenaline), the tooth was isolated under rubber dam and canals were accessed. Hedstrom files (Maillefer Dentsply, Baillaigues, Switzerland) and chloroform was used to remove cement from the tooth. An ultrasonic instrument (Piezon master, Optident, Skipton, UK) was used to loosen the cement in the root canal. "Zero" reading with an apex locator, Root ZX® (J. Morita Corp., USA) was established and a diagnostic working length radiograph was exposed. With working length 0.5 mm short of the zero reading, the canal was prepared by manipulating Flexofiles (Maillefer Dentsply, Baillaigues, Switzerland) in watch-winding fashion to master apical file size 40 and the files were stepped-back in 1 mm increments. Patency was maintained with size 10 K-Flex files (Dentsply / Maillefer, USA). 2.5% sodium hypochlorite solution and 17% ethylenediaminetetraacetic acid (EDTA) pH 7.0 (Henry Schein Inc., Melville, NY, USA) were used as the irrigants during root canal treatment. Non-setting calcium hydroxide paste (Merck KGaA, Darmstadt, Germany) was used as the intracanal medicament and IRM® (L.D Caulk Co., Milford, DE, USA) was placed over cotton wool to serve as the temporary dressing. At the subsequent visit, the tooth was obturated with gutta-percha using Roth root

canal sealer (Roth Drug Company, Chicago, IL, USA) as the cement. Apically, the canal was obturated by cold lateral condensation to mid-fill and thereafter by warm vertical condensation using Obtura® (Obtura Corp., Missouri, USA) to backfill the canal. The access cavity was restored with composite resin restoration and a post-operative radiograph was taken (Figure 4).

The number of visits involved in all teeth was: the 25 and 26 were treated over 2 visits, 41 and 42 were treated over 3 visits whilst the 44 and 45 needs a longer appointment which was approximately 5 visits in total. This was due to the difficulties encountered during the removal of the root canal filling material in the 45. All teeth were dressed with non-setting calcium hydroxide paste for a minimum of 2 weeks.

Several difficulties were encountered during the treatment of these teeth such as the presence of a fractured instrument in the root canal of the 41. The fractured spiral filler was by-passed with Flexofile (Maillefer Dentsply, Baillaigues, Switzerland) and a zero reading with an apex locator, Root ZX (J. Morita Corp., USA) was established. The fractured instrument was loosened after apical canal preparation and later was successfully removed following enlargement of the root canal by step back technique (Figure 5). There were two root canals in the 42 and the canals joined and become one after instrumentation was completed. The crown in the 44 was removed prior to start of treatment using ultrasonics and crown remover instruments and the post was concurrently removed with an ultrasonic device with a CT4 Piezon® tip (Piezon master, Optident, Skipton, UK) to loosen it and a curved mosquito forceps to slowly rotate it out of the canal (Figure 6). The crowns on the 25 and 26 were removed prior to initiating retreatment using the same method as in tooth 44. Both teeth had been previously root filled with hard-setting tooth-colored cement which was removed under an operating microscope and was successfully retreated. Amalgam cores were placed in 25 and 26 and the patient was referred back to her General Dental Practitioner for the final restoration of the 25, 26, 41, 42, 44 and 45. The patient was reviewed at six months and all teeth were asymptomatic. The 25 and 44 were restored with porcelain bonded to metal crown and the 26 with a full metal crown. The patient was satisfied with the outcome of the root canal treatment and radiographs were taken to assess the healing of the periapical lesions (Figures 7, 8 and 9). The patient will be reviewed annually for at least 4 years to assess the outcome of the root canal treatment.

Another complication encountered during treatment was pain and temporary numbness of the lower right lip during the treatment of the 44 and 45 after the administration of inferior dental nerve block. The numbness and pain disappeared after a few days.



Figure 1 : Periapical radiograph showing tooth 41 and 42. There was a fractured instrument present in the root canal of 41 and periapical radiolucencies were evident involving both teeth.

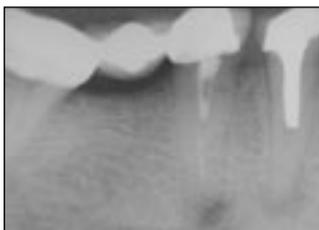


Figure 2 : Periapical radiograph showing tooth 44 and 45. There was no root filling present apical to the post in 44 and inadequate root filling present in tooth 45. There were periapical radiolucencies associated with both teeth.



Figure 3 : Periapical radiograph showing tooth 25 and 26. There were inadequate root filling present in both teeth and there were periapical radiolucencies associated with both teeth.



Figure 4 : Post-operative radiograph was taken of tooth 41 and 42 after obturation.



Figure 5 : The fractured instrument was removed from the root canal of tooth 41.



Figure 6 : The post and full porcelain crown of tooth 44 which was removed prior to initiating root canal retreatment.



Figure 7 : Periapical radiograph taken at 6 months review appointment showing complete resolution of the periapical radiolucencies associated with 41 and 42.



Figure 8 : Periapical radiograph taken at 6 months review appointment showing a decrease in size and density of the periapical lesions associated with 44 and 45.

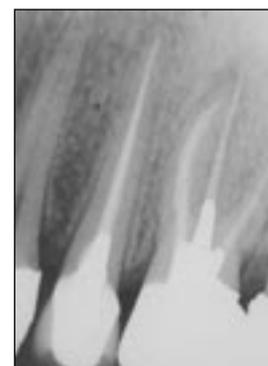


Figure 9 : Periapical radiograph taken at 6 months review appointment showing partial resolution of periapical radiolucencies associated with 25 and 26.

DISCUSSION

There have been significant advances in endodontic treatment in recent years. Nevertheless with all the potential for endodontic success, the fact remains that root canal treatment may fail if treatment is not adequately executed. Clinical studies have shown that the presence of infection during obturation, the size of periapical lesion, and the level of root filling at the radiographic apex influence the prognosis of root canal treatment.^{4,11} There are various treatment options available to treat endodontic failure cases. One of the choices is non-surgical retreatment, where the goal is to access the pulp chamber and to rectify any deficiency of the previous root canal treatment via an orthograde approach. This approach is preferable when an improper or defective root filling is the cause of the endodontic failure and the root canal is coronally accessible and negotiable.

Surgical approach may be necessary when the apical portion of the root canal system cannot be accessed coronally. This may be due to restorative reasons (presence of a well fitting post and core restoration), iatrogenic reasons (presence of a fractured instrument/silver point, nonnegotiable ledge, and perforation in the middle or apical third of the root) or anatomical reasons (severely curved root apex, sclerosed canal). Hence, periradicular surgery must always be the final choice in retreatment, and should be reserved for those cases where it has proved impossible to completely clean, shape and fill the root canals coronally. Surgery is not a method of overcoming inadequate orthograde treatment. Moreover, if the reason for failure has not been correctly diagnosed, periradicular surgery may actually compromise the long-term success. Some of the drawbacks of periradicular surgery include shortening of the root length, difficult access to the root apex and root canal, and periodontal problem (such as gingival recession). Periradicular surgery will also transfer the apical foramen to a more coronal position thus creating an 'open' apex that will predispose to a new or recurrent infection, a periapical lesion, and, finally failure.¹⁰

In this case, the 25, 26 and 45 had been root filled with tooth coloured cement which was short of ideal. The complete removal of the cement in the 25, 26 and 45 and the ability to clean and obturate the canals to the full working length should result in the complete resolution of the periapical lesion. Nonetheless care should be taken during removal of the cement as to avoid iatrogenic perforation of the root canal because the cement was quite solid and difficult to remove with drills and endodontic files alone. The use of an ultrasonic tip to vibrate and loosen the cement aids its removal. The 45 was difficult to treat as the access cavity had to be drilled through the crown, which resulted in limited access and vision. Extra care and patience is essential during the removal of the cement and the clinician should check the angulation of the bur from time to time to ensure the correct angulation and path in order to avoid inadvertent perforation of the root. The use of an operating microscope improves the vision within the pulp chamber thus permitting greater operating accuracy in removal of the cements.

In tooth 44, the post and crown were removed prior to start of treatment. This was to ensure complete access to the root canal and to be able to shape, clean and filled the root canal to full working length. Successful post removal in the 44 depends on several factors such as the type and length of the post, the type of the cementing agent, canal morphology, operator's skills and the aids of ultrasonic instrument. However, one should be careful when removing a post in the root canal as to avoid iatrogenic damage to the root structure such as root fracture and perforation. The use of an operating microscope increases visibility and ultrasonic instrumentation loosens the post sufficiently to facilitate its removal.

Root canal treatment of tooth 41 had failed because the root canal was inadequately filled and there was a fractured spiral filler present apical to the short root filling. The fractured spiral filler was removed during canal preparation and enlargement. The ability to by-pass the fractured instrument and enlargement of the canal during instrumentation help to loosen it and aid its removal. Only after the removal of the fractured instrument can the root canal be negotiated, cleaned and shaped optimally. Several factors influence the non-surgical removal of the fractured instrument such as the diameter, length, and position of the instrument within the canal, the canal curvature and root morphology and also operator's skill and experience.¹² In this case the canal was straight and the fractured instrument was not tightly bound to the dentinal walls thus allowing the endodontic file to by-pass it and aids its removal. However, attempts to remove the fractured instrument may lead to ledge formation, over-enlargement and transportation of the prepared root canal or perforation. Thus, the clinician has to evaluate the options of attempting to remove the instrument, bypassing it or leaving the fractured portion in the root canal. This decision should be made with consideration for the pulp status, canal infection at the time of treatment, the root canal anatomy, the location of the fractured instrument and the type of the fractured instrument.¹⁴

In view of the pain and numbness of the lower lip after the administration of the mandibular block, this could be caused by several factors such as injury to the inferior alveolar nerve during administration of the local anaesthetic, pressure on the mental nerve from inflammation of the periapical lesion associated with the 45 which is in close proximity to the mental foramen or extrusion of irrigating solution beyond the apical foramen. Consequently, care should be taken during the administration of local anaesthetic for mandibular nerve block and especially not to extrude the irrigating solution beyond the apical foramen.

The prognosis of the treatment was considered good in view of the absence of symptoms and the reduction in size of the periapical radiolucency. Further reviews will be needed to monitor the healing of the lesions and its complete resolution would be anticipated. Follow-up period of 2-4 years is recommended as larger lesion would take longer time to heal.^{4,10}

CONCLUSION

In summary, non-surgical root canal retreatment should be regarded as the first option in the treatment plan of a failed root canal treatment. The treatment should be undertaken with great care as to avoid unnecessary iatrogenic damage to the root structure and the removal of any obstructing agents in the root canal space is essential to ascertain complete eradication of infection in the root canal prior to obturation thus improving the treatment outcome.

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The Incidence of Mouth, Tongue and Lip Cancers in Kelantan, Malaysia

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SUMMARY

This study was undertaken to determine the oral cancer (OC) incidence between January 1994 to December 1998 in Kelantan, Malaysia using surgical records. Incident cases of OC (140-145, ICD-9) were obtained from surgical biopsy records of the main referral centres for head and neck surgery in Kelantan. Ethnic- and site-specific incidence rates were calculated and this was standardised to the world population. Fifty cases were identified. Mouth cancer was the predominant site of OC while the cheek was the most common sub-site. The overall age-standardised incidence rate adjusted to world population for OC was 1.13 ± 0.15 per 100,000. When inter-ethnic comparisons of site-specific incidence rates were made, the incidence of mouth cancer was highest in the Indian ethnic group while the Malay ethnic group had the highest rate for tongue and lip cancers. The incidence for mouth cancer among Kelantan Indians was higher compared with Indians of the Indian subcontinent and other migrant Indian populations. OC is relatively uncommon in Kelantan. An inter-ethnic variation in OC incidence was observed. Surgical records provide an alternative way of obtaining data for the estimation of incidence.

Key words:

Oral Cancer Incidence; Hospital-based incidence

INTRODUCTION

Epidemiological studies of oral cancer (140-145, ICD-9) have recorded incidence rates for a country or region based on an overall population count.¹ From these studies, large and notable differences in the incidence of oral cancer by topographical regions of the world were found. In a country or region composed of a single predominant ethnic group, the incidence data generated reflects the pattern of oral cancer within that ethnic population. In countries or regions with a multiethnic population, this crude method often disregards the influence of the diverse ethnic make-up within that population. While this practice was probably done to increase the number of cases available for evaluation, it may result in the generation of an inaccurate data which is potentially misleading, particularly because differences in cancer rates between populations are known to be affected in part by ethnic and socio-cultural differences.

From a global perspective, oral cancer is fast becoming an important form of cancer.² In many parts of Asia, oral cancer continues to be a major health problem, where it constitutes one of the most common forms of

cancer reported annually. In western countries where oral cancer incidences are relatively low, oral cancer is now a worrying health concern because of the increasing incidence of oral cancers in certain regions of Europe and in younger males of the population.³

Geographically, Malaysia covers an area of 329,733 km² and is generally described as being of three main areas, the peninsular region (known as the Peninsular Malaysia) and the Sabah and Sarawak, both located on the north of Borneo. The mid-year post-censal population estimates of Malaysia based on the 1991 population census data was approximately 21.5 million, where males and females accounted for 50.5% and 49.5% of the population respectively.⁴ The Malaysian population is multiethnic and the largest ethnic group is the Bumiputera (62.8%), comprising of 50.8% Malays and 12.0% Other Bumiputera (the indigenous people of Sabah and Sarawak). Other ethnic groups in Malaysia are the Chinese (26.3%), Indians (7.5%) and others (3.5%).

In 1963, the incidence rate of oral cancer in Peninsular Malaysia was estimated at 3.1 per 100,000.⁵ However, the detail of data collection was unavailable and thus the finding may be questionable. A formal

population-based oral cancer registry did not exist until 2001, making estimation of oral cancer incidence in Malaysia difficult. In 2001, the Malaysian National Cancer Registry (NCR) was set-up for all cancer and this registry reported its first (2002) and second (2003) cancer incidence data for Malaysia.⁶ However, the NCR has not reported cancer incidence data by states and there is yet no 5-year incidence data required to study cancer trends. Despite these limitations, oral cancer is regarded as an important health problem because it accounts for about one-fifth of all lesions diagnosed in the oral region (7). A survey of oral cancers diagnosed by the Division of Stomatology at the Malaysian Institute of Medical Research over 25 years revealed that the vast majority of oral cancers consisted of oral carcinomas (90.9%). These cancers occurred more commonly in the fifth to seventh decade, showed a slight female predilection and were highest amongst the Indian ethnic group (59.3%).⁷

A nationwide survey of oral lesions conducted in 1993/94 in Malaysia revealed that the prevalence of oral cancer and oral precancer was 0.04% and 1.4% respectively.⁸ The available figures from this national survey give more of an indication of the status of oral precancer in Malaysia and identify the risk groups for oral cancers. The prevalence of oral precancerous lesions was highest amongst the Indians (4%) and the indigenous people of Sabah and Sarawak (2.5%) and the lowest prevalence was amongst the Chinese (0.5%).

Establishing a population-based cancer registry is the ideal means for provision of a database on various aspects of cancer, from which incidence rates are estimated.⁹ Despite the fact that half of the new cancer cases occurring in the world occur in many developing countries, many of these countries lack population-based cancer registries.¹⁰ Other sources of data compilation are in existence and accessible to measure levels of cancer in the community. If incident data may be extracted from existing databases of a defined population in Malaysia over a defined period, it may be possible to calculate the incidence rate while awaiting the full 5 year report of the Malaysian National Cancer Registry. This pilot study was designed to determine the oral cancer incidence between 1994 – 1998 in Kelantan using surgical biopsy records.

MATERIALS & METHODS

Kelantan is an integral state within the Federation of Malaysia, located on the north-east of Peninsular Malaysia covering an area of 14,920 km² (Figure 1). The total population of Kelantan was approximately 1.2 million, comprising of 49.5% males and 47.7% females with a population density of 0.012 per km². In keeping with the rest of Malaysia, the Kelantan population is multi-ethnic and the main ethnic groups are the Malay (91.2%), Chinese (4.3%), Indians (0.5%) and others (4.0%) (Figure 2) (Data supplied by the Statistics Department of Malaysia for the 2000 mid-year population estimates based on the 1991 Population Census data).

The definition of cancer sites used in this study is based on the definitions of the World Health Organization (WHO) International Statistical Classification of Diseases, ninth edition (ICD-9) (1) to allow for worldwide comparison of incidence rates. The cancer of mouth includes the gum (143, ICD-9) the floor of mouth (144, ICD-9) and other and unspecified parts of the mouth (145, ICD-9). Cancer of the tongue (141, ICD-9) includes the base, body and tip of tongue, the lingual tonsil, the junctional zone between the tongue and the anterior tonsillar pillars and other tongue sites. Cancer of the lip (140, ICD-9) excludes the skin of the lip. Metastatic tumours and primary tumours of oropharynx, nasopharynx, hypopharynx and major salivary glands were excluded from this study.

The data on patients with oral cancer in Kelantan were obtained from the surgical biopsy records of the Head and Neck Clinic, Faculty of Medicine, Universiti Sains Malaysia (USM) and the Oral Surgery Clinic, Kota Baru Hospital (HKB) for the period of January 1994 to December 1998. Both hospitals combined accounted for the only referral centre for the management of head and neck pathology in Kelantan.

Two separate lists of patients from the respective hospitals were obtained. Patients were matched for name, identification card number and hospital registration number manually to avoid the possibility of overlap. The home addresses of patients were also checked to exclude patients who were not of Kelantan residential status at the time of biopsy. The biopsy reports were reviewed by an oral pathologist (RBZ) and the tumour histological diagnosis re-classified according to the WHO International Typing of Oral and Oropharyngeal Tumours.¹¹

The annual population data for the state of Kelantan during the period of 1994 to 1998 were obtained from the Department of Statistics, Malaysia and this was used in the measurements of the crude and age-standardised incidence rates respectively (Data supplied by the Statistics Department of Malaysia for the 1994 to 1998 mid-year population estimates based on the 1991 Population Census data).¹⁰ The age-standardised incidence rates were adjusted to the world standard population.¹²

RESULTS

Demographic details and oral cancer

From the investigated period of January 1994 to December 1998, three hundred and ninety-eight (398) surgical biopsy reports were recorded from the hospitals. From this sum, 50 incident cases (12.6%) of oral cancers were identified. The number of cases was only slightly higher in USM (n=27) compared with HKB (n=23). From the 50 cases, there were 36 cases of mouth cancer, 9 cases of tongue cancer and 5 cases of lip cancer (Figure 3). Among the sub-sites forming mouth cancer cases, the majority occurred in the 'other and unspecified parts of the

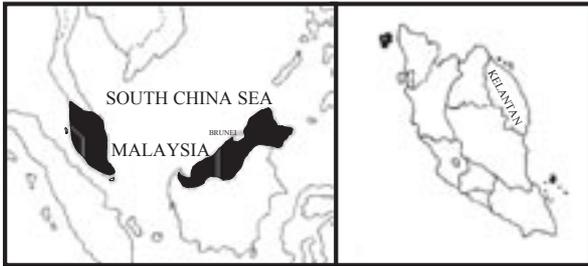


Figure 1: Map of Malaysia, showing the state of Kelantan

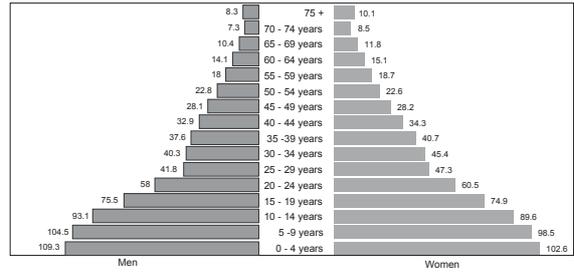


Figure 2: Kelantan population table for year 1996. Total Population - 1,441.1 ('000). (Data supplied by the Statistics Department of Malaysia for the 1994 to 1998 mid-year population estimates based on the 1991 Population Census data)

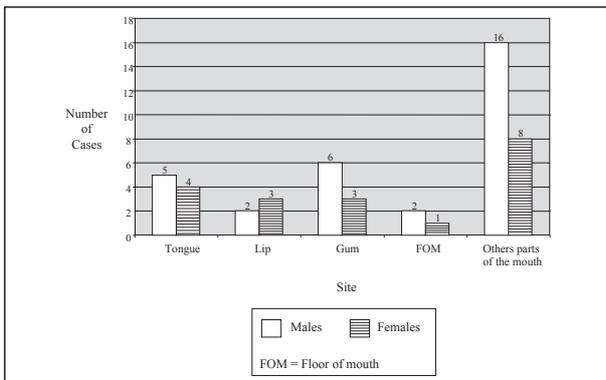


Figure 3: Distribution of Oral Cancer According to Site

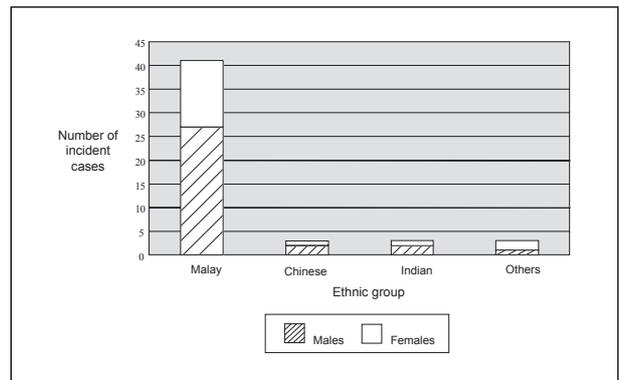


Figure 4: Distribution of Oral Cancer According to Ethnic Group

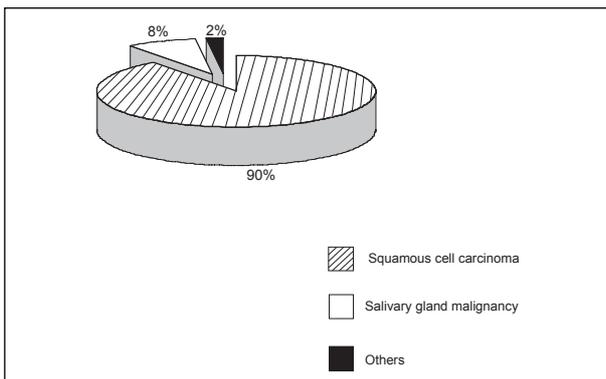


Figure 5: Proportion of Oral Cancer According to Histological Type

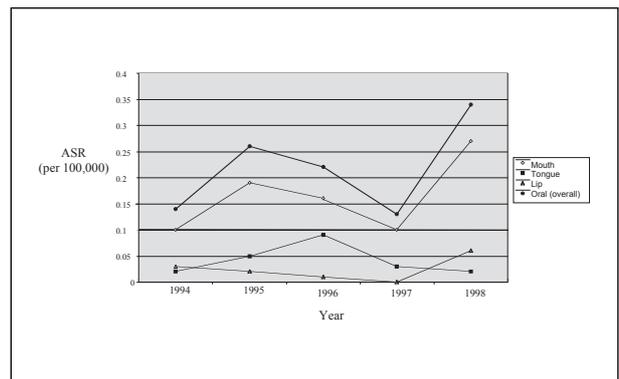


Figure 6: Secular annual incidence of Oral Cancer in Kelantan, 1994-8

mouth' (145, ICD-9). In this sub-site, the cheek (145.0, ICD-9) accounted for the single most common site (37.5%). In the tongue cancers, all cases were diagnosed from the anterior two-thirds of the tongue.

Overall, the mean age at presentation was 59.1 years (range, 11 to 92 years). The mean age at presentation for mouth and tongue cancers were in the sixth decade (60.0 and 63.3 years respectively) while lip cancers presented at an earlier age of 44.7 years. As a whole, oral cancer cases predominated in males by 1.6 times compared to females. The male predilection was particularly evident in mouth cancer, where the amount seen in males was triple to that seen in females. However, the male to female ratio was equal in tongue cancer and in lip cancer, female outnumbered males (5:1).

The proportion of oral cancer cases according to ethnic groups are as follows (Figure 4): the Malays (82%), Chinese (6%), Indians (6%) and others (6%). All cases of tongue cancer in this study occurred in the Malay ethnic group and this group also recorded the highest number of cases in mouth and lip cancers. In this ethnic group, the majority of cases occurred in males compared with females.

Tumour histology

Squamous cell carcinoma was the most common histological diagnosis (90%) and these tumours were mainly well differentiated (62.8%). Moderately differentiated tumours accounted for 27% while poorly differentiated was only recorded in 2.3% of cases. Tumour differentiation was not recorded in the remainder of cases (7%). Other histological types recorded were minor salivary gland carcinomas (adenoid cystic carcinoma, 1 case; mucoepidermoid carcinoma, 3 cases) and a sarcoma case (Figure 5).

Overall incidence rates for oral cancers

The secular annual incidence rates of oral cancers in Kelantan are shown in Figure 6. The year 1998 showed the highest incidence rate (0.99 per 100,000) while year 1997 had the lowest incident rate (0.36 per 100,000). The overall crude incidence rate over the period of January 1994 to December 1998 was 0.74 per 100,000. The age-standardised incidence rate adjusted to the world population (ASR) for oral cancers was 1.13 ± 0.15 per 100,000. The ASR for oral cancer cases in males and females were 1.5 and 0.8 per 100,000 respectively.

Mouth cancer

The overall ASR for mouth cancer for the Kelantan cohort was 0.9 per 100,000. The ASR rates for Malay male and Malay female were 1.1 and 0.3 per 100,000 respectively. The ASR rates for male Chinese and female Chinese were 1.2 and 1.0 per 100,000 respectively. The ASR rates for male Indian and female Indian were 15.0 and 9.0 per 100,000 respectively. The ASR rates for Indians were comparable to the whole population reported by the NCR which is 7.2 and 16.5 for male and female Indians respectively.⁶

Tongue cancer

The overall ASR for tongue cancer for the Kelantan cohort was 0.2 per 100,000. The ASR for tongue cancer in Malay male and Malay female were 0.2 and 0.19 per 100,000 respectively.

Lip cancer

The ASR for tongue cancer for the Kelantan cohort was 0.1 per 100,000. The ASR for lip cancer in Malay male and Malay female were 0.02 and 0.15 per 100,000 respectively.

DISCUSSION

Results obtained from this study indicate that oral cancer is a relatively uncommon occurrence in Kelantan. There was preponderance for oral cancer to occur in males and those in the sixth decade of life. This was similar to that found in a previous study by Ng and Siar (1997) where oral cancer was higher in males and in the older age group.⁷ The predominant ethnic group with oral cancer in Kelantan was the Malays while the study Ng and Siar (1007) showed the Indians were the predominant group. This was probably due to the higher proportion of this ethnic group in this region of Malaysia.

In this cohort, mouth cancer was the most common site for oral cancer accounting for 72% of all cases. This figure is slightly higher to that reported in a study of 14,253 cases of squamous cell carcinoma from the United States Armed Forces Institute of Pathology (64.8%)¹³ but is comparable to that obtained from a 10-year survey of consecutive biopsies of primary oral squamous cell carcinoma carried out in Peninsular Malaysia (74.2%).¹⁴ In mouth cancer, the 'other and unspecified parts of the mouth' (145, ICD-9) accounted for the majority of cases and in this group, the cheek was the dominant sub-site of involvement. This finding was also observed in the Peninsular Malaysia survey.¹⁴

Tongue cancer appeared to be less common than mouth cancer in the Kelantan cohort. The proportion of tongue cancer was only 18% in this study but this was higher than that reported from the Peninsular Malaysia survey of 12.3%.¹⁴ Both Malaysian figures were much less compared with other studies that report a range of between 30-40%.^{13,15-17} All tongue cancer cases recorded in Kelantan were from the anterior two-thirds and none from other parts of the tongue. Tongue cancers involving the anterior two-thirds of the tongue are more accessible for early diagnosis compared with other parts of the tongue and this may contribute to the numbers obtained in this study. Lip cancers were the least common of all cases of oral cancer in Kelantan (10%) occurring mainly in the lower lip and commissures.

The overall crude incidence rate for oral cancer in Kelantan during the years of 1994-98 was estimated at 0.74 per 100,000. This figure is comparatively lower than

the crude incidence rates of oral cancer seen in some areas of the South East Asian region such as Chiang Mai, Thailand (3.8), Singapore (10.1) and Manila, Philippines (13.0).¹⁸ Admittedly, such a comparison may not truly reflect the relative frequency of oral cancer because the differences are potentially due to biases introduced by specific characteristics of the respective populations. When the incidence was age-adjusted and standardised to the world population, the overall ASR of oral cancer was found to be 1.13 ± 0.15 per 100,000, where a higher rate was seen in males (1.5) compared with in females (0.8).

The usefulness of an overall incidence rate for oral cancer is somewhat limited because it fails to indicate the actual frequency of individual anatomical sites, which constitutes oral cancer. The elucidation of site-specific incidence rates may provide a more accurate picture of oral cancer within a region compared with an overall incidence rate because intraoral site-specific malignancies are often due to different aetiological factors. In Kelantan, the ASR of mouth cancer was found to be about five and nine times higher compared with tongue cancer and lip cancer respectively. This finding is reminiscent to that observed in India and Pakistan but is in contrast to the patterns seen in some parts of France and in Newfoundland, Canada where the incidence of tongue cancer and lip cancer is higher than mouth cancer respectively.¹⁹⁻²¹

It is well recognised that site-specific incidence rates vary considerably according to geographical regions.² The inter-regional differences are associated with the effects imparted by the local physical environment (e.g., air and its pollutants, water and trace elements, irradiation- solar and other forms), lifestyle influences (e.g., patterns of diet, childbearing, alcohol and tobacco consumption) and the perpetuation of socio-cultural practices (e.g. risk habits).

Established risk factors of oral cancer in Malaysia include tobacco use (smoked and chewed), alcohol consumption and areca nut exposure via betel quid chewing.²² A study evaluating the oral habits of 41 patients with primary oral cancer seemed to suggest that betel quid chewing habit is the most important risk factor in the development of oral cancer in Malaysia where it was the most common single habit (83%).²³

In Malaysia, betel quid chewing is a custom observed mainly in the Indian and in some sections of the Malay ethnic group. The Indian ethnic group frequently chews a basic mixture containing the betel leaf, areca nut and slaked lime. Many Indians also add tobacco and other ingredients like cloves to the basic mixture. The indigenous people of Sabah and Sarawak also chew the basic betel quid mixture similar to the Indians. However, the indigenous people of Sarawak do not add tobacco to the betel quid package but concurrently chewed tobacco as a separate item to the quid. In the Malay ethnic group, betel quid chewing is presently practiced by the older age group, mainly those living in the villages and chew the basic betel quid mixture albeit rarely adding the tobacco.²⁴

In many parts of the world, betel quid chewing habit is closely related to the development of carcinoma of the gum/alveolus, sulci and cheek.^{5,25-28} While tongue cancers are usually associated with tobacco use (smoking and chewing) and alcohol consumption, habitual chewers of betel quid are also prone to tongue cancer when the quid is placed in the 'gutter' zone and also by the collection of the juices produced, especially when tobacco is chewed simultaneously. The tongue (particularly, the lateral borders and the base of tongue) along with the floor of mouth, forms a basin, the so-called 'gutter zone', where the carcinogenic material in the saliva flow into, collect and pool.²⁰ Subsequently, these areas experience relatively longer and higher amounts of carcinogen exposure compared with other parts of the mouth. The risk factors to lip cancers are not well understood but ultraviolet radiation, tobacco and betel quid chewing habits have been cited.¹⁹

In the Kelantan cohort, a large proportion of cancer involving the 'gum/alveolus-sulcus-cheek' complex accounted for the high incidence of mouth cancer. The cheek was the leading sub-site of involvement suggesting an aetiological role for betel quid chewing habit. However, there is emerging evidence in Malaysia that the higher incidence of this specific intraoral sub-site may not entirely be the result of betel quid habit. While the betel quid habit may be able to provide some explanation regarding the pattern of mouth cancer in the Indian ethnic group, it has not been able to explain the incidence of mouth cancer in the Malay and Chinese ethnic groups in Kelantan (the nationwide survey in 1993/94 showed that both ethnic groups are much less engaged in the betel quid habit).⁸

It has been suggested that the inter-ethnic differences in oral malignancy rates in Malaysia may be partially attributed to the ethnic variations in cultural habits and serum levels of micronutrients.²⁹ Based on historical and anthropological studies, the Malay ethnic group forms the native population of the Malaysian states while the Indian and Chinese ethnic populations have immigrated to Malaysia in the past, coming from various regions in the Indian subcontinent and China respectively. In Kelantan, all ethnic groups have stayed within the same environment but different oral malignancy rates are observed among these ethnic groups. Because all ethnic groups live within a shared environment, it is possible that the differences in rates i.e. degree of divergence between the migrant and host population in Kelantan may be due to inter-ethnic differences in the genetic make-up, lifestyle and socio-ethnic habits.

Among Kelantan Malays, a recent population-based study of this subgroup showed that there were differences in prevalence of oral precancers between quid chewers (without tobacco) and non-quid chewers.²⁴ This suggests that betel quid chewing may not be regarded as the sole causative factor for oral precancer in the Kelantan Malays and other risk habits may have important contributions.

Alcohol consumption as a habit is almost unheard of due to strict religious prohibition in a predominantly Muslim Malay population.

A recent report of the Second Malaysian National Health Morbidity Survey conducted in 1996 for those aged 15 years and above showed that Kelantan had among the highest prevalence of current smokers as compared to other states.³⁰ Such high prevalence of current smokers in Kelantan was also observed in the First Malaysian National Health Morbidity Survey conducted in 1986 for those aged 18 years and above.³⁰ These reports further suggest the possibility of tobacco smoking as an important causative factor for oral cancer in Kelantan. Other than tobacco smoking, dietary and genetic factors may play a role in promoting carcinogenesis. The Malays in Kelantan are known to have a high intake of preserved and fermented food in their diet. Among these are the wet and dry salted fish and fermented anchovy sauce (*budu*) (Zain, unpublished data).

Despite making up a relatively small proportion of the total Kelantan population, the Indian ethnic group showed the highest ASR for mouth cancer compared with other ethnic groups both in males and females. The Indians working in plantation estates without oral habits and lesions had relatively lower levels of serum micronutrients compared with other ethnic groups suggesting that their general dietary intake was low in fresh vegetables and fruits.³¹ They also showed a higher prevalence of oral habits including tobacco usage (smoked and chewed), alcohol consumption and betel quid chewing.²⁴

The oral malignancy rates of migrant population were listed in Table 1 to show contrast against the rates seen in the population in the country of origin.¹⁸ In the Malay ethnic group, the ASR figures of Singapore Malays seem to converge to the figures obtained in the Kelantan Malay in mouth and tongue cancer. This finding suggests that the difference in geographical location and environmental influences has not altered the risk of this ethnic group to oral malignancies except for lip cancer. In the Indian ethnic group, a large degree of divergence was observed. When the incidence figures were compared to those observed from the Indian subcontinent and the Indian population in Singapore, the ASR for the Kelantan Indians was higher for both males (ASR incidence rate=15) and females (ASR incidence rate=9). This finding is extremely surprising because it suggests that the incidence of mouth cancer among the Kelantan Indians is among the highest in the world (Trivandrum, India; 10.3). Another unexpected finding was the lack of tongue cancer among the Kelantan Indians because the incidence of tongue cancer is generally high in other Indian populations worldwide. This finding indicates that local factors in Kelantan may be responsible for the differences seen in the pattern of oral cancer among ethnic Indians. However, there is a possibility that genetic factors may have a role because the actual region of origin within the Indian subcontinent of this migrant population is unknown.

For mouth cancer, there was convergence between the Kelantan Chinese ethnic group and those from Hong Kong and Singapore. A slight divergence was seen with the Shanghai Chinese, where a higher ASR was observed in the Kelantan Chinese. It is possible that migrant Chinese have an altered risk of developing oral malignancy compared to mainland Chinese although it is unclear if the risk is higher (as those seen in Kelantan, Hong Kong and Singapore) or reduced (as that seen in California).

When individual annual ASR was examined for trends, there was an indication that the incidence of oral cancer may be on the rise in Kelantan. The increase seen is largely caused by an increase in the ASR of mouth cancer plus a contribution by the small rise seen in lip cancer (Figure 5). A rising trend in the incidence of oral cancer has also been reported in Japan³² and in many regions of Europe⁴ although rates seemed to have stabilised in India, a country known to have some of the highest rates of oral cancer worldwide.³³

The rising trend is the result of several factors. The most important factor is probably the rise seen in tobacco usage. Tobacco use is widespread in Malaysia and the vast majority of users are smokers where the prevalence of current smokers is rising particularly among males, the Malay ethnic group and in those of the lower socio-economic groups.³⁰ The rise in incidence may also be attributed to improved diagnostic capabilities as two separate screening exercises were undertaken in Kelantan in 1993/4 and 1997 respectively.^{8,24} In both instances, the training exercise includes the knowledge of screening for not only oral cancer but also precancerous lesions, indicating that patients at a higher risk for oral cancer were identified for follow-up reviews. Thus the increase in incidence in 1995 and 1998 appears to be in keeping with the times these screening exercises were conducted. Finally, a rise in the proportion of the elderly within the Malaysian population may contribute to the increasing incidence. This is due to a longer life expectancy resulting from better living conditions and health services.³⁴

This study also shows that surgical pathology records of the hospital are an extremely useful data source for the estimation of incidence rates in the absence of a population-based cancer registry. Pathological data is a crucial component of cancer research, especially cancer registries.³⁵ Previous studies have shown that it is possible to use histopathological-based data of cancer cases catalogued by hospitals to calculate epidemiological data including incidence rates.^{36,37} Furthermore, a recent randomised multicenter audit of databases reported that pathology reports provided more accurate information for pathological data for registries compared with special purpose standardised pathology forms.³⁸

However, the information provided by the surgical records are limited when compared with a population-based registry. Surgical records, like many hospital-based records are oriented towards administrative and patient purposes.³⁹ Some of the data items recorded by the

Table I: ASR Incidence rates per 100,000 population for oral cancer for Kelantan (1994-98) in comparison to other regions in the world

	Mouth cancer		Tongue cancer		Lip cancer	
	Males	Females	Males	Females	Males	Females
Shanghai, China	1.0	0.8	0.7	0.5	0.1	0.0
Hong Kong(Chinese)	1.9	0.8	2.1	1.2	0.1	0.0
California (Chinese)	0.7	0.1	0.7	0.6	0.1	0.1
Singapore (Chinese)	1.6	0.6	1.3	0.7	0.0	0.0
Kelantan, Malaysia (Chinese)	1.2	1.0	0.0	0.0	0.0	0.0
Bombay, India	6.2	4.6	6.5	2.3	0.4	0.3
Trivandrum, India	10.8	5.9	4.4	1.8	1.1	0.0
Singapore (Indian)	3.7	3.6	2.8	0.6	0.0	0.9
Kelantan, Malaysia (Indian)	15.0	9.0	0.0	0.0	0.0	0.0
Singapore (Malay)	1.1	0.4	0.4	0.2	0.0	0.0
Kelantan, Malaysia (Malay)	1.1	0.3	0.2	0.2	0.0	0.2
Manila, the Philippines	3.1	3.1	2.6	2.1	0.1	0.1
Chiang Mai, Thailand	2.6	2.6	2.0	1.2	0.2	0.4

hospital are different from those collected by a population-based registry, often containing far less information. This has been the case in this study where the information regarding risk habits were incomplete and had to be excluded from evaluation. Follow-up and mortality information was also not obtainable through surgical records. Finally, relying solely on surgical records as opposed to hospital-based and population-based registries may result in inaccurate overall picture. It is unlikely that the noted absence of cancer involving the base of tongue is factual. It is possible that these cancers are left undiagnosed because of its inaccessible site or are seen by other surgical specialities, such as the Otorhinolaryngologists. Nevertheless, hospital-based registries have often been the first step towards creation of a population-based cancer registry in many places worldwide, particularly developing countries.

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The Expert Says... National Cancer Registry

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Cancer is a major cause of morbidity and mortality in Malaysia. Cancer data is required by everyone who is involved in the cause of reducing the nation's cancer burden. This includes the physicians, researchers, epidemiologists, public health planners, legislators and others. Recognising this truth, the Ministry of Health directed the establishment of the Malaysian National Cancer Registry (NCR) which was established on the 29 April 2002. Prior to this, Malaysia had several regional registries such as those in Penang, Sabah and Sarawak. The NCR was established to integrate the various regional registries and other data sources to achieve nation-wide cancer registration. The reporting of cancer cases in Malaysia is not mandatory by law, and is voluntary.

To date, there have been only 2 reports issued by the NCR, i.e. for years 2002 and 2003. A total of 26,089 cancers were diagnosed among all residents in Peninsular Malaysia in the year 2002, however an estimated 10,656 cases were not registered. In terms of risk, 1 in 5.5 Malaysians can be expected to get cancer in his/her lifetime. Taking into account unregistered cases, the risk would be 1 in 4 Malaysians. In the year 2003, a total of 21,464 cancer cases were diagnosed among Malaysians in Peninsular Malaysia. The lower incidence rate suggests that the NCR were more successful in eliminating prevalent cases.

What is a cancer registry?

By definition, a cancer registry is an information system designed for the collection, storage, management, and analysis of data on persons with cancer.

The very first idea of having a written catalogue of diseases probably dates back to the late 16th century in England. The English crown appointed elderly, epidemic-scared women to search the countryside for the dead and dying. These ladies published weekly "Bills of Mortality" for each parish, tabulating deaths by causes such as 'the purples' (probably leukaemia), 'riting of the lights', 'consumption' (often an effect of cancer), and of course, the plague. (Table 1)

There are two major types of cancer registries: hospital-based registries and population-based registries. The goals of a hospital based registry include: improvement of patient care, professional education, administrative information and clinical research. On the other hand, the goals of population-based registries are: cancer prevention, early detection, determination of cancer rates and trends, patterns of care and outcomes, research and evaluation of control efforts.

The objectives of the NCR are to:

1. Determine the disease burden attributable to cancer by quantifying the magnitude of cancer morbidity and mortality, and its geographic and temporal trends in Malaysia.
2. Identify subgroups in the population at high risk of cancer to whom cancer prevention effort should be targeted.
3. Identify potential risk factors involved in cancer.
4. Evaluate cancer treatment, control and prevention programme.
5. Stimulate and facilitate epidemiological research on cancer.

Some terms which one would have to understand when trying to make sense of the cancer registry report are:

Incidence

The number of newly diagnosed cases of cancer during a specific time period

Incidence Rate

The ratio of the number of new cancers of a specific site/type occurring in a specified population during a year to the number of individuals who were at risk for the given cancer. To get the rate, the number of people diagnosed each year (for example, 26,089 in 2002) is divided by the size of the population (24 million) and multiplied by 100,000. This rate is usually expressed as the number of cancers per 100,000 persons.

Table 1. Historical events

2500 B.C. Earliest known description of “cancer”; the “Edwin Smith” and “George Ebers” papyri which describe surgery, pharmacology, and mechanical and magical treatments
400 BC Hippocrates described a breast “cancer” as "karkinoma" (known now as carcinoma) during surgical removal of a tumor
1629 A.D. Cancer is first mentioned as a cause of death in the Bills of Mortality in England
1728 London’s “General Census of Cancer” – the first known systematic collection of information on cancer
1839 Implementation of death registration (what we now know as “death certification”) in the United States
1901 Earliest known population-based systematic collection of data on people with leprosy in Norway (a population-based leprosy registry)
1926 A bone sarcoma registry established by Dr. Ernest Codman at Massachusetts General Hospital, one of the earliest registries established for a specific type of cancer The first hospital-based cancer registry at Yale-New Haven Hospital was organized in New Haven, Connecticut
1973 The Surveillance, Epidemiology and End Results (SEER) Program of NCI establishes the first national cancer registry program in the United States
1992 US Public Law 102-515 establishes the National Program of Cancer Registries (NPCR) and is administered by the US Centers for Disease Control and Prevention (CDC)
2002 Malaysia establishes the National Cancer Registry

http://training.seer.cancer.gov/module_cancer_registration/unit1_history_dates.html

Age-standardised incidence rate

Age-standardized incidence (ASR) is required for meaningful comparison of 2 populations that differ in their age structure. Age-standardisation adjusts rates to take into account how many old or young people are in the population being looked at. When rates are age-standardised, one knows that differences in the rates over time or between geographical areas do not simply reflect variations in the age structure of the populations. This is important when looking at cancer rates because cancer is a disease that predominantly affects the elderly. So if cancer rates are not age-standardised, a higher rate in one country is likely to reflect the fact that it has a greater proportion of older people..

Cumulative risk

The Cumulative Risk (CumR) is the risk that an individual would have of developing the cancer in question during a certain age span if no other causes of death were in operation

Prevalence

The number of people alive on a certain date who have been diagnosed with cancer at any time in their lives. This is different from incidence in that it considers both newly diagnosed and previously diagnosed people

Oral cancer in Malaysia

From the 2002 and 2003 NCR reports, we can see that tongue cancers in males represented 1.3% of total number of cases, in females, the figure was lower at 0.5 % in 2002 and 0.8% in 2003. Mouth (which includes the rest of oral mucosae and gums) cancer represented 1.2% of total number of cases for both genders in the two years. Compared with international figures, the ASR for mouth cancers were the second highest for males and highest rates for females in the world. Among the 3 major ethnic groups, Indians had the highest incidences for cancers of the mouth, tongue, larynx, oesophagus and bone. The risk of cancers of the mouth, larynx, oesophagus and tongue was also higher as compared to the other major ethnic groups. The cumulative lifetime risk for Malaysian Indian females developing mouth cancer was 1 in 42.

What you can do?

A thorough head and neck examination should be a routine part of each patient's dental visit. If your patient has a history of betel quid chewing, tobacco or alcohol use, you should be particularly vigilant during your examination, however remember that a quarter of patients who develop oral cancer do not have any risk habits. If your patient has any risk habits, take a history of their use and inform your patients of the association between betel

quid, tobacco or alcohol use, and oral cancer. Please take a biopsy or refer your patient to an Oral Surgery department for a biopsy if your patient shows any possible signs/symptoms of oral cancer (Table 2). Do follow up to make sure a definitive diagnosis is obtained on any possible signs/symptoms of oral cancer.

Table 2 Possible signs/symptoms of oral cancer

1.	A mouth ulcer / sore that fails to heal or bleeds easily
2.	All red or red and white patches in the mouth that will not go away
3.	A lump or thickening in the mouth, tongue or throat
4.	Difficulty in chewing or swallowing food
5.	New persistent pain

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Efficacy of Fibrin Glue as Compared to Suture Material in the Healing of Intra-oral Incisions – An Animal Study

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ABSTRACT

Suturing techniques have been used since ancient times, as an adjunct to enhance the natural healing process following soft tissue loss or damage. However, sutures have disadvantages like placement of a foreign material within the tissues and trauma caused by needles during their placement. Fibrin glue is a natural product developed from blood plasma that has haemostatic and adhesive properties. As it has inherent wound healing properties, other than its adhesiveness, it is a potential alternative to sutures. This investigation on dogs compares the closure and subsequent wound healing of mucosal incisions with silk sutures and fibrin glue. It is found that the efficacy of fibrin glue in closure of mucoperiosteal flaps was comparable to that of sutured sites. On histological examination the wound healing was found slightly better in fibrin glue applied sites compared to sutured sites.

Key words:

Fibrin glue, wound closure, wound healing, mucoperiosteal flap, oral surgery.

INTRODUCTION

The placement of any type of foreign suture material within the tissue following surgical intervention or traumatic injury causes side effects such as local tissue reaction and fibrous capsule formation. The use of tissue adhesives as an alternative to sutures has long been an area of interest. Different types of adhesives are presently available such as cyanoacrylates, mussel adhesives, gelatin-resorcinol-formaldehyde (GRF) and fibrin glue (FG).¹ Fibrin glue is found to be the most promising one with multiple advantages associated with it such as biodegradability; adhesiveness, ability to plug smaller and medium sized blood vessels in the wound area and its physiological nature.²

The use of fibrin glue is well documented in surgical literature. It was first tested by Young & Medawer in 1940. Since then, their use has become widespread in neurosurgical, cardiac and gastrointestinal surgical procedures.³ In maxillofacial surgery it has been used in

different types of procedures. Matras⁴ in 1982 reported successful use of fibrin glue to repair a damaged facial nerve. Stajcic⁵ (1985) used fibrin glue to close an oro-antral communication. Rakcoz et al.⁶ (1993) used fibrin glue as a local haemostat in patients with various bleeding disorders who underwent extractions without alteration of haematological factors. According to Sullivan et al.³ (1997) it can be used to manage sinus membrane perforation, which is one of the problems encountered in placing a dental implant in an atrophic maxilla.

Additionally, fibrin glue has been used for skin graft fixation,⁷ securing hydroxyapatite granules for maxillary ridge augmentation,⁸ securing particulate cancellous bone and marrow in mandibular reconstruction⁹ and as a local drug delivery system.¹⁰

This study has been performed to compare and evaluate the efficacy of fibrin glue in closure of mucoperiosteal flap and evaluate histologically the healing of mucosal incisions closed with silk sutures and those closed with fibrin glue.

MATERIALS & METHODS

The animals used in this study were three mongrel dogs (n=3) of either sex weighing between 10-14 kg. The animals were housed and looked after as per the regulations of the committee for the purpose of control and supervision of experiments on animals (CPCSEA, 1997). The dogs were on standard laboratory diet and water ad libitum.

The fibrin glue that was developed at the Sree Chitra Tirunal Institute for Medical Science and Technology has undergone several preclinical studies and the Ethics committee has approved its use in human patients. The composed glue consisted of fibrinogen concentrate (100 mg/ml) obtained from screened single donor plasma and bovine thrombin (Merck, Germany) dissolved in 35 mM CaCl₂ to get an enzyme activity of 250 IU ml⁻¹. To mix and deliver both components of the glue precisely at the surgical site from two separate syringes, a specially fabricated delivery system was used. The device enabled the delivery of both components simultaneously into the needle head, where it got mixed and within 1-2 seconds after mixing it was applied to the injured site.

On the day of the surgery, the animals were pre-medicated with atropine sulphate (0.1mg/kg) given subcutaneously and diazepam (1mg/kg) given intramuscularly (IM). After 30 minutes of pre-medication anesthesia was induced with a combination of xylazine (1mg/kg) and Ketamine HCl (20mg/kg) IM. Further anesthesia was given as and when needed by injecting half of the calculated initial dose.

The animals were then kept in lateral recumbancy, the intra oral sites were prepared with betadine solution. The surgical site consisted of the gingiva of the maxilla and mandible on both sides. Eight sites in each dog were selected for closing with 3-0 silk and eight with fibrin glue (FG). A mucoperiosteal flap was reflected by placing a vertical incision from the free gingival margin to the

mucogingival junction and a crevicular incision in the premolar and molar region. Hemostasis at each site was achieved by pressure pack. The flaps were closed with 3-0 silk on the right side and FG on the left side. The FG was placed between the bone and mucosa. The flaps were immediately placed back in situ and gentle pressure was applied for 1-2 minutes with a saline-wet gauze. Strict aseptic conditions were adhered through out the procedure. Antibiotics were not given pre and post surgically to avoid interference with tissue healing if any.

Euthanasia of animals was done with an overdose of thiopentone sodium on the 3rd, 7th and 30th post-operative days. The mandible and maxilla were removed and blocks of bone with the flap were cut using a diamond saw and immediately fixed in 10% buffered formalin. Bone was decalcified in 10% formic acid. Following adequate decalcification blocks were rinsed in water. Dehydration was then carried out in ascending grades of alcohol (50-100%) followed by clearing in chloroform. Tissue was then embedded in paraffin wax. 5 micron thick sections were cut and stained with hematoxylin and eosin. Sections were histologically evaluated using a Nikon binocular optishot (Nikon, Japan) light microscope. The specimens were evaluated for inflammatory response, collagenization and epithelization.

RESULTS

The fibrin glue on application, was found effective in flap apposition as seen in Fig. 1a. Even though there was no restriction on the oral cavity movement of the animal, on third day the dehiscence was minimal and the flap remained in position (Fig. 1b) and the inflammation was also minimal. On the 7th day after the surgical procedure, mild dehiscence was found on one or two sites, but the other sites were well closed (Fig. 1c) By 30th day the healing of FG applied site (Fig. 1d) was as good as the sutured site (Fig1e).

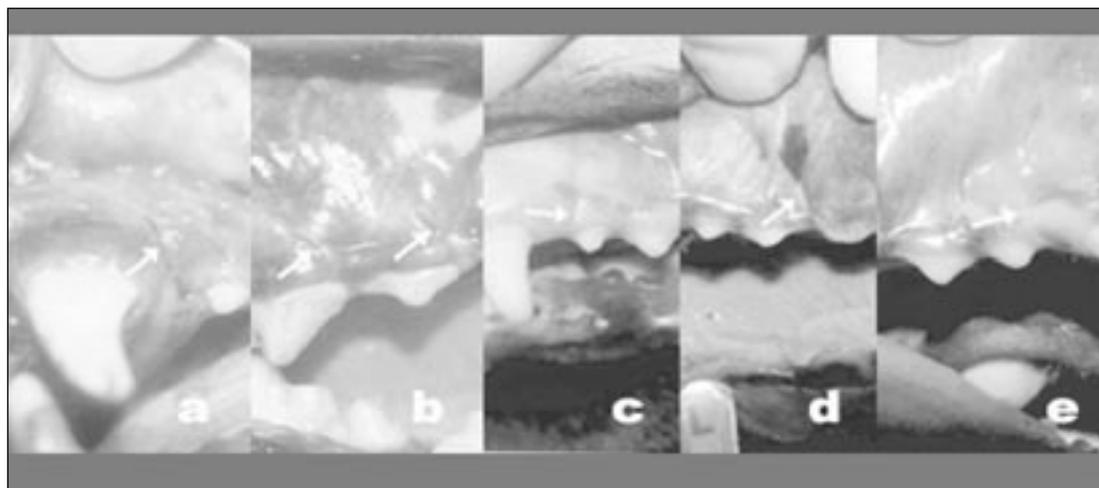


Fig1. Appearances of FG applied sites on the day of surgery (a), on 3rd day (b), on 7th day (c), on 30th day (d) and the sutured site on 30th day (e). Arrowhead indicates surgical sites.

Histological observation of the experiment sites collected on the 3rd post-operative day revealed that the inflammatory response was slightly more on the sutured site with increased presence of neutrophils and macrophages (Fig 2a). Fibrin glue treated side showed less inflammatory cells (Fig 2b). Slightly more amount of collagen matrix was seen at the fibrin glue treated site than sutured sites. Epithelization was very slow on both sites.

On examination of specimens collected from the animal that was sacrificed on the 7th post-operative day, inflammation had subsided on all areas but few macrophages were noted around the sutured sites.

Fibrin glue site showed (Fig. 3a) an increase in the presence of collagen matrix than sutured sites (Fig 3b). Epithelial cells were seen on both sites with more epithelization on the FG site than the sutured areas.

The specimen collected after 30 days did not show inflammation at any sites but a few macrophages were still noted around the sutured sites. FG sites maintained an increase in collagen matrix formation from that on the 3rd and 7th day compared to the sutured sites. There was significantly more epithelization on FG sites than the sutured sites (Fig 4a & b, respectively).

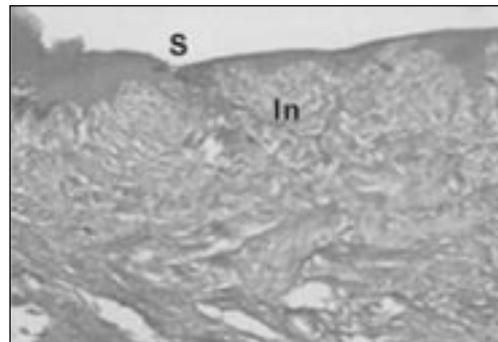
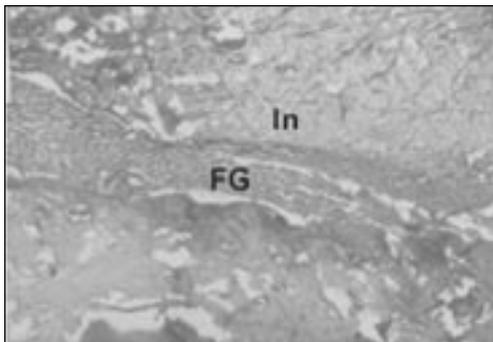


Fig 2. Photomicrograph showing inflammatory response on the 3rd post operation day around fibrin glue (a) and suture material (b). Magnification x15.

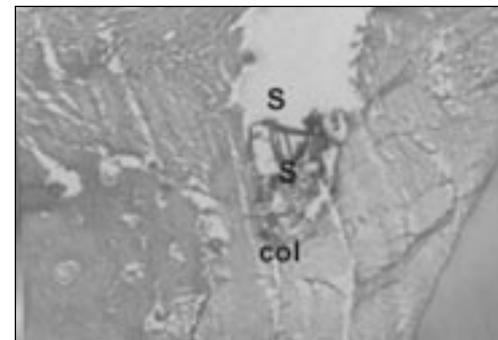
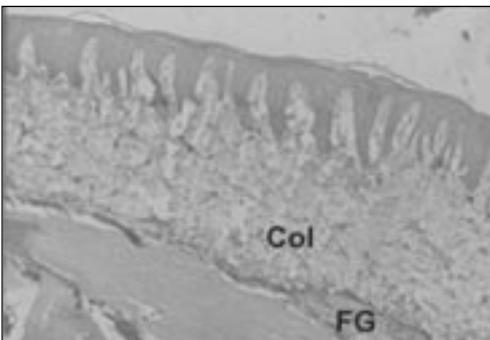


Fig 3. Photomicrograph on the 7th post-operative day showing, (a) Fibrin glue with increased amount of collagen matrix deposition and (b) Suture material with mild amount of collagen matrix deposition. Magnification x15.

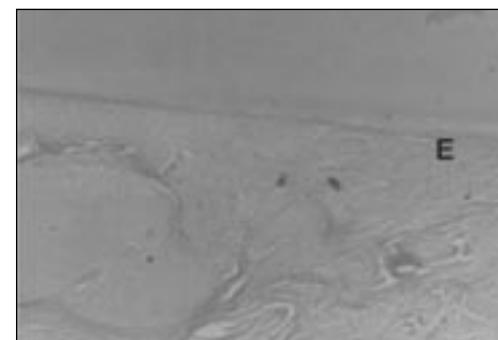
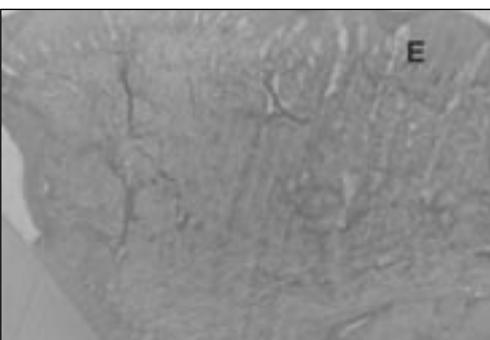


Fig 4. Photomicrograph showing epithelization on the 30th post-surgical day. (a) Increased epithelization with rete peg formation at the FG sites and (b) Mild amount of epithelization on the suture site. Magnification x15.

In summarizing the histological observation, the sutured sites had slightly more inflammatory response than the FG sites (mean 0.625 & 0.5 respectively) on the 3rd day (Fig 5). But this subsided over the subsequent days from both sites). Increased collagenization was noted on the fibrin glue site, which was maintained throughout the procedure (Fig 6). On the 30th day the mean values were 1.9 & 1.7 for FG and suture, respectively. Fibrin glue areas maintained a higher epithelization. The 30th day result showed that FG site had more epithelization than sutured sites with a mean of 1.625 & 1.5, respectively (Fig 7).

DISCUSSION

Dogs were considered for this investigation as it had an oral cavity large enough to provide an adequate number of sites.¹¹

We found that the fibrin glue is as effective as suture in closing the mucoperiosteal flaps. Histological evaluation revealed that FG produces less inflammatory reaction than sutures. This is probably due to the fact that FG is a natural product developed from blood. Pfluger *et al.*¹² reported that the fibrin glue system was completely resorbed from wound sites and the elimination of fibrin

from the organism is partly an enzymatic (fibrinolysis) and partly a cellular process (phagocytosis). This mimics the invasion and breakdown of clot occurring during the natural wound healing.¹³ Fibrinolysis is particularly high in richly vascular areas like the head and neck region.¹⁴

Collagenisation and epithelisation on the FG treated sites were slightly more than the sutured sites. This is similar to the observations of Kyeong *et al.*¹⁵ where they made a histological comparison between FG and sutures in wound healing of rabbit scleral homografts. FG promotes wound healing by providing a scaffold for the in-growth of cells.¹⁶ It also provides improvement in neovascularization during wound healing with less flap necrosis and more collagenization.¹⁷ It has also been reported to have a bactericidal effect.¹⁸

CONCLUSION

This investigation did not reveal any appreciable difference between fibrin glue and sutures. However, wound healing of FG site produced a more superior collagenisation and epithelisation. Therefore, fibrin glue offers a promising alternative to sutures in the closure of intra oral incisions.

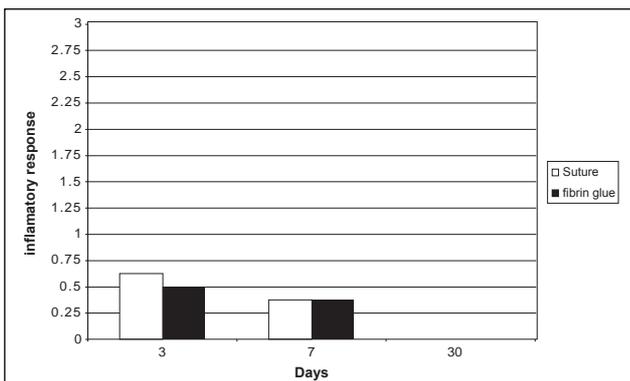


Fig 5. The graphical representation of inflammatory response on the study sites measured on 3rd, 7th and 30th day. The inflammation is found higher on suture sites compared FG sites on all days.

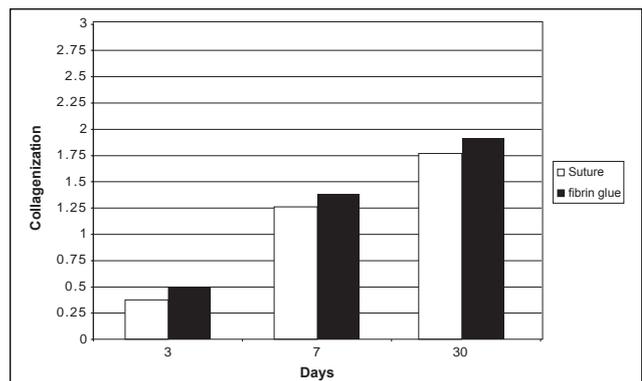


Fig 6. Collagen matrix deposition at the FG and suture sites. FG had an increased collagenization, which was maintained through out the study period.

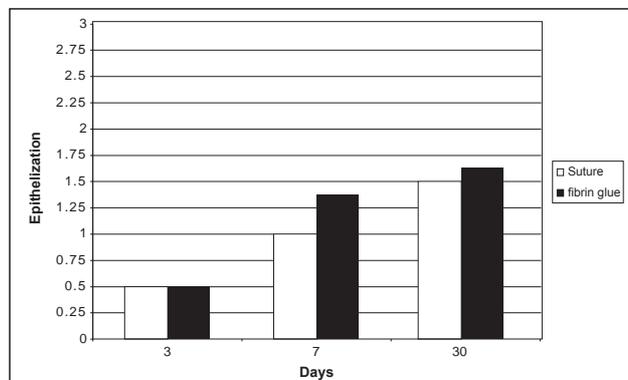


Fig 7. Comparison of epithelization at FG and sutured sites. Day 3 did not show any significant epithelization but day 7 & 30 showed FG having an increased epithelization than sutured area.

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Perception of Treatment Outcomes and Psychosocial Impact on Malaysian Cleft Patients

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ABSTRACT

Introduction: This prospective study assessed perceived treatment outcomes and psychosocial impact on cleft patients using an interview questionnaire. **Methodology:** 33 cleft lip & palate patients with mean age 17.2 years (range 12.1 -24.8), were interviewed after at least completing orthodontic treatment \pm alveolar bone graft. Pre-treatment malocclusion severity and treatment difficulty were categorized using the Goslon Yardstick. **Results:** The Goslon Yardstick categorization showed 30.3% Group 1 & 2, 18.2% Group 3, 18.2% Group 4 and 33.3% Group 5. 42.4% were teased about their disability, the number increased with malocclusion severity. All were satisfied with the professional counseling & management. No patient was dissatisfied/very dissatisfied with their treatment outcomes. The degree of post-treatment satisfaction was positively correlated with degree of pre-treatment malocclusion severity. There was significant difference between degree of satisfaction and age, with older patients more satisfied. No significant difference was found for race and gender. **Discussion:** There was a higher perceived need for nose, lip and jaw surgery from patients than professionals. Perhaps expectations were higher in these young patients. **Conclusion:** The majority of patients experienced positive psychosocial changes with improved confidence and self-esteem, better social interaction and positive support and feedback from family and friends. Although 21.2% felt that the protracted treatment interfered with school/work, all patients understood the importance of the procedures and felt that the outcome was worth the time spent.

Key words:

altered passive eruption, aesthetic crown lengthening, internal bevel gingivectomy.

INTRODUCTION

Aesthetic and functional improvement is an integral goal of all patients who seek orthodontic treatment and patients with cleft lip and palate (CLP) are no exception. There is no doubt as to the importance of physical attractiveness and the role it plays in one's self-esteem, social life and interactions among individuals^{1,2,3,4} although the perception of facial attractiveness is complex and highly individual. Many cleft patients are highly motivated to undergo a series of operations and protracted orthodontic treatment until adulthood in order to improve their appearance and function. Overall, the majority of CLP children and adults do not appear to experience major psychosocial problems, although some were particularly dissatisfied with their facial appearance, were depressed and anxious.⁴ A significant proportion of cleft patients were teased about their appearance/speech^{1,3,4,5} with some adversely affected and suffering from negative psychosocial

problems. Satisfaction with facial appearance was significantly correlated with a better quality of life and a better health-related quality of life and dissatisfaction was found to be the most significant predictor of depression.¹

Psychological outcome was as important as a good clinical outcome for the total rehabilitation and perceived well-being of these patients. Some of these patients and their families experience cleft-associated emotional problems such as behavioural and learning problems, depression and interpersonal difficulties^{1,4}. Multidisciplinary teams that effectively address the psychosocial needs of their patients besides organizing a comprehensive treatment approach can enhance patient satisfaction, compliance and treatment outcomes.^{1,3,4,7,8}

The purpose of this study was to assess perceived satisfaction of cleft patients with varying malocclusion severity in terms of treatment outcomes, counseling and comprehensive management, and psychosocial impact of treatment.

METHODOLOGY

Sample

This was a prospective study using an interview questionnaire and study models. Records of all cleft patients were retrieved from the daily register (1996-2004) from the main orthodontic clinics in Teluk Wanjah (Alor Star) and Perak Road (Penang); including those who have absconded, transferred, refused further treatment, or still on active treatment. Baseline information on patient demographics was recorded for all cases. Only full records complete with treatment card, radiographs and study models were included for selection.

Inclusion criteria

Patients who require multiple treatment modalities must have completed at least orthodontic treatment with/without completion of alveolar bone graft (ABG). A time frame of about two years from the start of the study was deemed adequate for current on-going patients to complete at least the orthodontic treatment with/without ABG or ABG with near completion of orthodontic treatment. This was estimated to produce a sample size of at least 30 patients for the interview.

Pre-treatment Study models

Pre-treatment study models were categorized into five groups in order of severity of the malocclusion and the difficulty of correcting it using the Goslon Yardstick⁹ as the measurement tool (Table 1). The Goslon Yardstick has been tested highly reliable for categorization and in discriminating the quality of results in different centers even when used by different observers.¹⁰ The ANB angle measured from lateral cephalogram radiographs represented the sagittal skeletal relationship and is used here as a guideline to determine the limits of orthodontic correction. Representative cases from the five groups in Goslon were used during the training and standardization exercise for the investigators (professional group) before categorizing the study models in the sample. This was to reduce intra- and inter-examiner bias.

Interview with Questionnaire

The research assistant (dental nurse) explained about the study & showed the items in the forms to the patient before being interviewed. They were assured of the confidentiality of their responses. Patients were encouraged to clarify any confusion and ambiguity in the questions with the assistant before answering them. The

questionnaire was formulated in two languages, English and Bahasa Malaysia and the patient chose the preferred language. The questionnaire was broadly divided into four main items, namely; treatment satisfaction with outcomes, attitude and expectations before treatment, overall satisfaction of treatment process, attitude and behavior after treatment. Degree of satisfaction was rated with a simple 4-point response scale; from “very unsatisfied”, “unsatisfied”, “satisfied” to “very satisfied”. Multiple responses of ‘Yes’, ‘No’ and ‘don’t know’ answers were also used.

Statistical analysis

Data was analysed using the statistical package for social science program, SPSS version 10.0. The sample was tested for normality and appropriate parametric or non-parametric tests applied. The sample was normally distributed so parametric tests were applied. Pearson’s correlation was used to test for association of satisfaction with the different treatment outcomes and psychosocial impact in different ages, and Chi-square test for gender and ethnic group respectively. Since there were so few Indian patients, only Malay and Chinese patients were compared statistically. Statistical significance was flagged at P value ≤ 0.05 . Where assumptions in Chi-square were not met, the exact Fisher’s test was applied. One-way analysis of variance (ANOVA) was used to compare differences between post-orthodontic treatment age and need for further surgery. Where no statistical significance was found or statistical tests unable to be performed; crosstabulations, box-plot and bar-chart graphs were performed to suggest trends.

RESULTS

There were a total of 155 cleft patients (71 males, 84 females) with full records from 1996-2004. Clefts cases ranged from 1.9% cleft lip / submucous cleft / cleft palate only, to 19.4% Unilateral right CLP (RUCLP), 49.7% Unilateral left CLP (LUCLP) and 29% Bilateral CLP (BCLP). From this selection we managed to interview a total of 33 patients (15 males, 18 females) with mean age of 17.2 years (range 12.1 – 24.8) at post-orthodontic treatment. There were 16 Chinese (48.5%), 13 Malay (39.4%) and 4 Indian (12.1%) of whom 6 had RUCLP (18.2%), 19 had LUCLP (57.6%) and 8 had BCLP (24.2%). Overall, more than 50% fell into the ‘poor’ and ‘very poor’ Goslon grouping, with more patients in the ‘poor’ and ‘very poor’ groups in RUCLP, LUCLP and BCLP respectively (Fig. 1).

Table 2 shows the psychosocial impact of treatment on patients in terms of improved self-confidence, social interaction and peer/family support. Generally there is positive impact although some patients may be too young to make a conclusive opinion. There was a higher perceived need for further surgeries on the lip and nose by patients than the professionals (Table 3). Although there was no statistically significant difference between patient's age and perception for need for further surgery, all patients in the 'don't know' group were younger (≤ 16 years) than the 'yes' or 'no' groups. The mean age of patients who perceived further need were younger than patients who said 'no need' (>17 years). Although chi-square or exact Fisher's tests could not be performed, box-plot graphs suggested that more Malay than Chinese patients perceived further need of surgery to improve their appearance. Crosstabulations also showed that all patients who had orthodontic treatment only without ABG did not perceive the need for further surgery, while those who said 'yes' or 'don't know' were those who had completed both orthodontic treatment and ABG (Fig. 3).

The age at first presentation in the orthodontic clinic is very varied, ranging from 6.8 to 20.6 years (mean 13.4 ± 7) with concomitant delay in alveolar bone grafting (Table 4). All patients have undergone previous primary lip and palate closure. All patients were satisfied/very satisfied with post-treatment improvements in terms

of facial appearance, chewing function, speech and easier cleansing of their teeth (Table 5). None were unsatisfied or very unsatisfied. There was no statistical significant difference in satisfaction for all treatment outcomes with gender or race (between Chinese and Malay). Age was statistically significant in degree of satisfaction for all treatment outcomes except improved confidence ($p \leq 0.05$). Generally, the older patients were very satisfied while younger patients were satisfied or don't know. Patients from all levels of the Goslon grouping were teased about their disability and the number increased with increased severity of their pre-treatment malocclusion (Fig. 2).

The majority of patients require at least orthodontic treatment and/or ABG as part of comprehensive care (Fig.3). Jaw surgery was usually indicated for Goslon Group 5 patients. At the end of the study, about 51.5% had completed both orthodontic treatment and ABG. About 24.2% who have completed three treatment modalities, that is, ABG, orthodontic treatment and jaw surgery were all 'very satisfied' in their improved facial appearance, alignment of teeth, masticatory function and cleaning of their teeth (Fig. 3). 3% were still waiting for orthognathic surgery at a later date and 39.4% was still undergoing orthodontic treatment or waiting for ABG. 19 patients (57.6%) had completed all the recommended treatment modalities.

Grouping	Prognosis	Definition
Group 1 & 2	Excellent/good	Requires either straightforward forward orthodontic treatment or none at all.
Group 3	Fair	Requires complex orthodontic treatment to correct the Class III malocclusion and possibly other arch malrelationships, but a good result can be anticipated (ANB angle ≥ 1 degree)
Group 4	Poor	At limits of orthodontic treatment without orthognathic surgery to correct skeletal malrelationships, and if facial growth is unfavorable (ANB angle 0 to -2 degrees)
Group 5	Very poor	Requires orthognathic surgery to correct the skeletal malrelationship if there is to be any prospect of obtaining satisfactory occlusal relationship (ANB angle ≤ -3 degrees).

Table 1. Goslon Yardstick⁹

Response N=33	ITEMS						
	Improved Confidence	Smile More*	Better Speech	Better Social Interaction*	Friends good opinion	Friends support*	Family support
Yes	32 (97%)	30 (90.9%)	31 (93.9%)	26 (78.8%)	28 (84.8%)	24 (72.7%)	33
No	0	0	0	1 (3.0%)	0	4 (12.1%)	0
Don't know	1 (3.0%)	3 (9.1%)	2 (6.1%)	6 (18.2%)	5 (15.2%)	5 (15.2%)	0

Using Pearson's correlation, statistical significance with post-orthodontic age flagged as * (P value=0.05), ** (P value=0.01)

Table 2. Patients' perception of psychosocial impact of treatment

Perception (n=33)	Nose surgery	Lip surgery	Jaw surgery
Professional group			
No need	29 (87.9%)	31 (93.9%)	32 (96.9%)
Further need	4 (12.1%)	2 (6.1%)	1 3.0%)
Patients			
No need	21 (63.6%)	23 (69.7%)	27 (81.8%)
Further need	8 (24.2%)	6 (18.2%)	2 (6.1%)
Don't know	4 (12.1%)	4 (12.1%)	4 (12.1%)

Table 3. Patients' and Professionals' perception on need for further surgery

	Orthodontic Treatment	Alveolar bone graft	Pharyngo-plasty	Rhino-plasty	Lip revision	Jaw surgery
Mean	13.4	15.0	13.0	18.0	18.1	19.9
(S.D.)	3.72	3.51	-	4.55	4.02	1.65
Median	13.5	14.7	13.0	20.0	18.8	20.1
Mode	multiple*	11.0*	13.0	9.3*	11.0*	17.0*
Minimum	6.8	9.3	-	9.3	11.0	17.0
Maximum	20.6	23.0	-	22.3	21.9	21.9

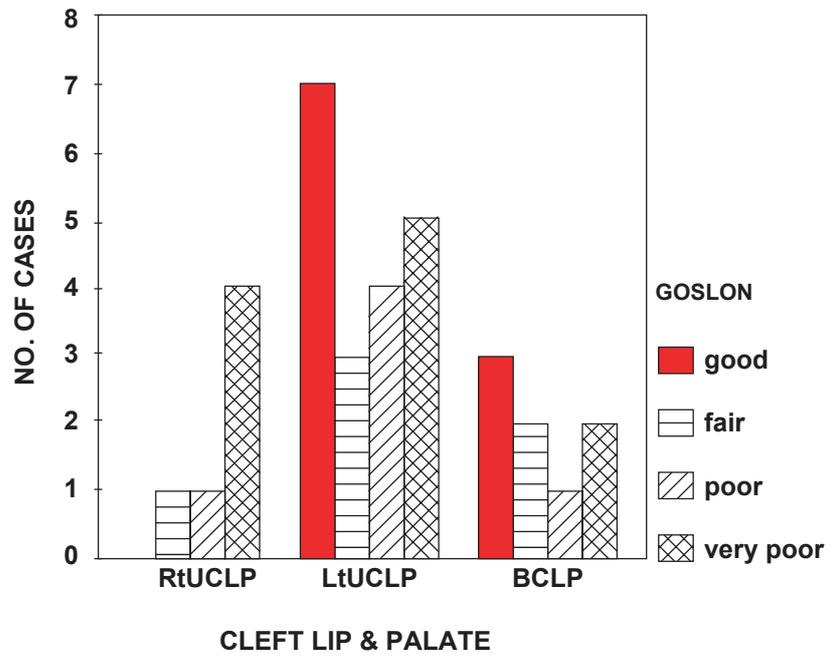
Standard Deviation (S.D.)

Table 4. Age (years) at different treatment procedures

Patients' Perception	Goslon Yardstick			
	Group 1&2	Group 3	Group 4	Group 5
NUMBER OF PATIENTS				
1. Facial appearance **				
<i>Satisfied</i>	8	6	5	2
<i>Very satisfied</i>	2	0	1	9
2. Overall appearance **				
<i>Satisfied</i>	7	6	5	1
<i>Very satisfied</i>	3	0	1	10
3. Alignment of teeth **				
<i>Satisfied</i>	7	3	4	1
<i>Very satisfied</i>	3	3	2	10
4. Chewing function *				
<i>Satisfied</i>	8	4	3	2
<i>Very satisfied</i>	2	2	3	9
5. Cleaning of teeth **				
<i>Satisfied</i>	7	5	3	1
<i>Very satisfied</i>	3	1	3	10
6. Speech *				
<i>Satisfied</i>	9	5	6	3
<i>Very satisfied</i>	1	1	2	8

Note: There were no patients who were unsatisfied or very unsatisfied in all treatment outcomes. Using Pearson's correlation, statistical significance with post-orthodontic age flagged as * (P value=0.05), ** (P value=0.01)

Table 5. Patients' perception of treatment outcomes from different Goslon groups



RtUCLP Right unilateral cleft lip & palate
 LtUCLP Left unilateral cleft lip & palate
 BCLP Bilateral cleft lip & palate

Fig.1 Distribution of cleft lip & palate cases using Goslon Yardstick (n=33)

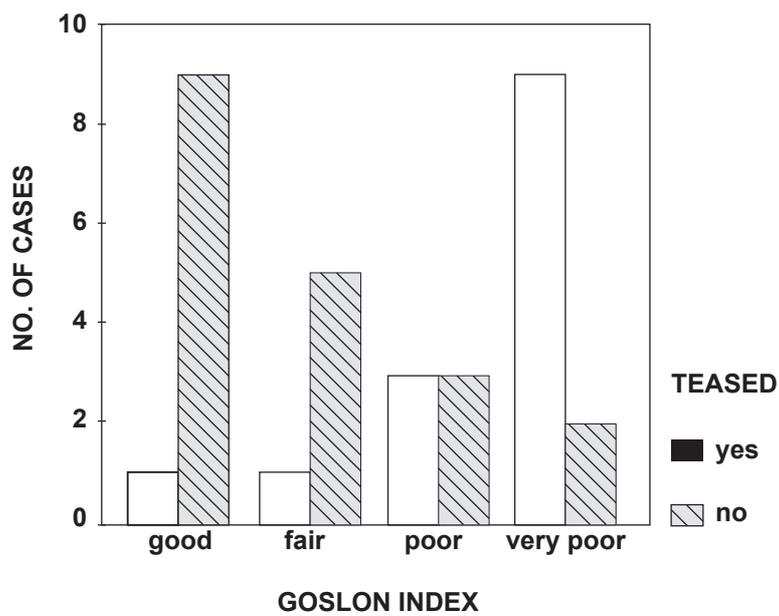
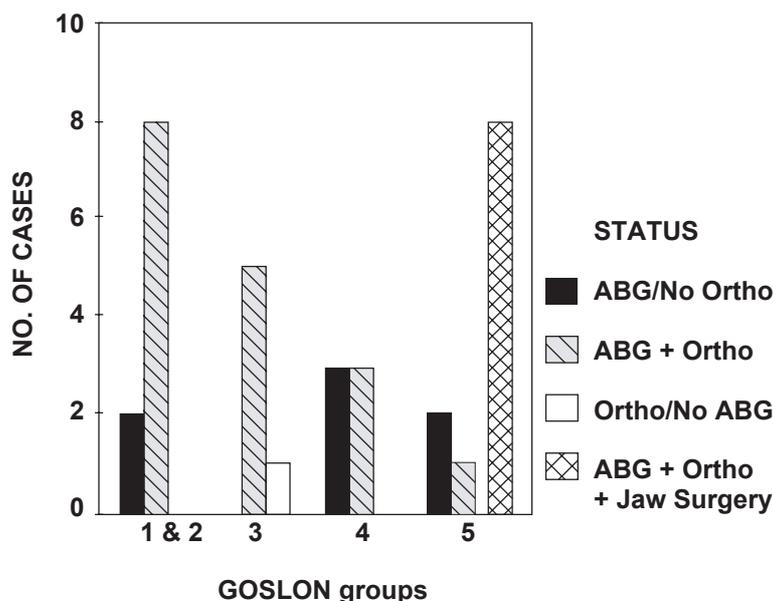


Fig 2. Pre-treatment malocclusion severity & teasing experience



Definition:
 ABG/No Ortho = ABG done. Orthodontics complete but not debonded
 ABG + Ortho = Complete ABG & orthodontics
 Ortho/No ABG = ABG not done yet. Completed orthodontic preparation
 ABG+Ortho+Jaw surgery = Complete ABG, orthodontics & jaw surgery

Fig 3. Treatment received at time of interview

DISCUSSION

More than half of the patients in our sample fell in the ‘poor’ and ‘very poor’ Goslon groups, which was comparable to that found in the study by Hathorn et al.¹¹ in the United Kingdom. Patients with more severe disability and malocclusion (Group 4 & 5) were generally more satisfied with the results than those with milder malocclusion before treatment. This seems logical since the improvement is more apparent in these patients. They benefit most with treatment and hence probably appreciate the treatment more in all aspects. In the current study, 42.4% of the patients were previously teased about their facial appearance and/or speech and this occurred more in those with more severe malocclusion/facial deformity. These patients may be subject to the undesirable opinions of their peers but their self-confidence rose and they appear to socialize/interact better after basic orthodontic treatment and alveolar bone graft (Table 2). Similar findings were reported in cleft patients in the United Kingdom^{1,2,4,12} although South African adults appear to have less problems with social and marital relationships.³

All the patients in our study were satisfied/very satisfied with improvement in speech although the majority did not have speech therapy. Broder et al.¹³ and

Strauss et al.¹³ reported satisfaction in improved speech in 62% and 69% of patients respectively following comprehensive management including speech therapy. Although their patients were pleased with their current speech status, it was disturbing that many rated themselves as only moderately understandable (19.1%) or as not understandable (8.5%). Laitinen et al.¹⁵ showed that misarticulations in the Finnish dental consonants increased and dental arch dimensions decreased with the severity of the cleft. Aoshima et al.¹⁶ compared anterior crossbite and normal bite in both UCLP and non-UCLP Japanese patients and the results suggested that normalization of reversed occlusion leads to favorable growth of the upper jaw in UCLP patients with anterior crossbite. These observations possibly could account for some spontaneous improvement in speech with treatment even without the added benefit of speech therapy as perceived by patients in our study. Patel and Ross³ reported that speech therapy appeared to have enhanced the quality of lives of a group of South African adult cleft patients with improved communicative skills and intelligible speech.

All the patients in the current study are satisfied/very satisfied with the services provided by the relevant specialists. High levels of satisfaction were reported in other centers although many parents/ patients would like to

have more knowledge and be more involved in the treatment planning decisions.^{1,5,17} Multidisciplinary cleft teams that effectively address both the physical and psychosocial needs of their patients/parents were found to have enhanced patient satisfaction, cooperation and treatment outcomes.^{1,3,4,7,8,18}

Less than 25% of our patients felt the need for further improvement on the nose and/or lip compared with 47% of patients in the study by Marcusson.² This may be explained by different perception with age difference. Their patients' mean age was 24.2 years (range 19.5 – 29.2) while our patients' mean age was 17.1 years (range 12.1 – 24.8). There was a difference in opinion between professionals and patients on the need for further surgery to improve aesthetics on the lip, nose and jaw (Table 3). The need for further jaw surgery may change with age depending on the growth of the patient as some patients are still young. The current study found statistically significant difference in perception of treatment outcomes with age, and in contrast younger patients tend to perceive more need of further surgery. Assessment of lip and nose aesthetics is quite subjective and this was similarly observed by Marcusson² although in contrast their professional group recommended more operations.

In our study, the age at alveolar bone grafting was very varied as this depends on the age the patient first presented in the clinic. Although the mean age at ABG was 15 years, there was a wide range between 9.3 and 23 years. Some patients presented late due to ignorance or cultural beliefs. Some had postponed treatment due to financial difficulties, inconvenience, lack of time, non-compliance or were scared of surgery/ hospitals. In a large multicenter study by Williams et al.¹⁹ they found that 15% of 12-year-olds had not received an alveolar bone graft, and only 58% of bone grafts done were successful. Although more than two third of their subjects were judged to have poor facial appearance by the professional group, patient and parent satisfaction were found to be generally high.

Limitations of study

Our sample size was too small for statistical analysis between the three ethnic groups. Comparison between Malay and Chinese patients only could be done. Patients were not from a uniform age group (teenagers and adults) and that may result in different responses in degree of satisfaction with treatment outcomes.

CONCLUSION

All patients appear to be satisfied with the treatment and management provided by the relevant public specialist services. Cleft patients who have more severe malocclusion and cleft-related problems benefit and appreciate most from comprehensive management. Generally, the majority of patients experienced positive psychosocial changes with improved confidence and self-esteem, better social interaction and positive support

and feedback from family and friends. Comprehensive management of cleft lip and palate patients requires coordinated teamwork involving many disciplines and extends over many years. It is only by the preservation of the dentition with its supporting alveolar bone, required hard and soft tissue surgical correction that the ideal treatment objectives of improved aesthetics and good function can be achieved.

RECOMMENDATIONS

1. Improve public awareness on the importance of seeking early treatment and educating primary health care personnel on the importance of referring patients for multidisciplinary treatment at the appropriate age to reduce needless distress and teasing in school.
2. Improve counseling and education of parents with cleft children for better compliance to the required treatment protocols. This is also important to banish ignorance and allay fears from negative cultural myths/beliefs.
3. Improve staff education to promote understanding of parents' experiences and anxiety. Can be used in the general media to promote public understanding and better acceptance of cleft patients.
4. Improve optimal timing of treatment procedures by regular recalls and monitoring so that patients are not neglected/lost in the system.
5. Form local support groups either from offshoots of non-government organizations (NGO) like the Cleft Lip and Palate Association (CLAPA) or from the local pool of cleft patients/parents. Often, shared information/advice, empathy and emotional support from fellow sufferers in the local community are more amenable and effective than professional advice. A simple way would be to have specific days to treat/review all cleft patients in the orthodontic clinics.

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An Audit on Unsupervised Active Orthodontic Patients

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ABSTRACT

This was a retrospective audit of patients starting treatment, in the Orthodontic Unit of Klinik Pergigian Jalan Gambut, Kuantan. This study aimed to identify patients, who were in active treatment, but had not been attending the clinic for review appointments. Treatment cards and case note entries were screened. Active patients having defaulted on review appointments were identified. Descriptive statistics was then applied. 20 out of a total 299 patients who had active treatment had failed to attend review appointments in at least the past 4 months from the audit date. 13 (65%) patients were female and 7 (35%) were male. All 20 (100%) were from Kuantan district. The mean age at start of treatment was 14.3. The types of appliances given were: fixed appliances (10 patients, 50%), functional appliances (5 patients, 25%) and removable appliances (5 patients, 25%). No trends in terms of gender, age at start of treatment and place of residence were identified.

Key words:

altered passive eruption, aesthetic crown lengthening, internal bevel gingivectomy.

INTRODUCTION

A period of a few years is usually required to complete a patient's orthodontic treatment. Potential hazards of orthodontic treatment are well documented.¹ This information is conveyed to the patient (and parents/guardians) before treatment is commenced. In spite of this, it is not uncommon for the odd patient, who is in active treatment, to 'disappear' only to 'reappear' a significant period after his/her last appointment date. On examination at such a time, it is frequently noted that the orthodontic appliances are broken, the teeth and gums are unhealthy and the treatment aims are compromised due to unwanted tooth movements. It was proposed to audit this incidence of 'unsupervised active patients' in the Orthodontic Unit of Klinik Pergigian Jalan Gambut, Kuantan, Pahang.

Study aims

The aim of this audit was to quantify the number of active patients who had not been attending the clinic for regular review appointments

If any, trends in terms of gender, age at start of treatment and place of residence of these patients was to be identified.

Standard set

There should be **no(0)** active patients that had not attended the clinic for a period of more than **4 months**.

MATERIALS AND METHODS

All patients who were taken on for treatment in a calendar year were identified from the patient register. All treatment cards were screened individually. Due to time constraints, this audit was limited to patients who registered for treatment in the years 2000-2002 only.

From the notes, the gender of the patient, the age at start of treatment (rounded to age at last birthday) and place of residence (town/city eg. Kuantan, Pekan, Rompin, Kemaman etc) were noted.

Patients were classified according to the categories below:

- Treatment not begun (Patients under review, patients who just had records taken, patients having treatment plans discussed and separators placed)
- Active patients (Patients with any appliance – including active removable appliance, bands, transpalatal arches, headgear - fitted)
- Retention patients (Patients given retainers)
- Discharged (Patients who have been discharged)

For patients in active treatment only, the date of the last appointment the patient attended the clinic for a review was noted. This is noted from the last entry date on the treatment notes.

All active patients who had not been seen for a period of more than 4 months from the audit date were identified. A data entry form is used to summarize all information.

If there was any patient who was still in active treatment, but had not been attending the clinic for review appointments, appropriate action was instituted. The patient was contacted, whenever possible, by telephone. The reason/s for failing appointments was asked. An appointment was arranged and his/her treatment was then re-evaluated.

Descriptive statistics was then applied to compile and analyze the data. Any trends such as the gender, age at start of treatment and place of residence of these patients was noted and compared with patients who had no problems attending regular appointments.

RESULTS

There were a total of 365 patients registered to begin treatment.

They had the following general characteristics:

- Gender: Male (111) ; Female (254). The ratio of female to male patients registered is more than 2:1.
- Place of residence: Kuantan (303). 84.1% of patients appear to have their place of residence in Kuantan and it's surrounding area. Other places of residence noted were such as Rompin, Pekan, Jengka, Maran, Kemaman, Chukai, Kerteh and Kuala Terengganu.
- Mean age at registration: 14.6

For all patients who registered and proceeded to have active treatment, their characteristics are as follows:

- Total patients: 299
- Gender: Male (89) ; Female (210). The ratio of female to male patients is more than 2:1
- Place of residence: Kuantan (251). 83.9% of patients are from Kuantan and its surrounding area. Other places of residence are the same as for all registered patients above.
- Mean age at start of active treatment: 14.1

For all patients who were still in active treatment but had not attended an appointment in the last 4 months from the audit date, the summary is as follows:

- Total patients: 20
- Gender: Male (7) ; Female (13). The ratio of female to male patients defaulting appointments is almost 2:1
- Place of residence: Kuantan (20). 100% of patients defaulting appointments are from Kuantan and its surrounding area.
- Mean age at start of active treatment: 14.3
- Type of appliance given: fixed appliance/s (10), functional appliance/s (5), removable appliance/s (5)

This data is summarized in Table 1.

TABLE

Table 1: Summary of results

Total patients	Number	Gender		Place of residence (Kuantan) Number (%)	Mean Age
		M	F		
Registered	365	111	254	303 (84.1)	14.6
Proceeding to have active treatment	299	89	210	251 (83.9)	14.1
In active treatment and defaulting appointments for > 4 months	20*	7	13	20 (100)	14.3

* Type of appliances given:

- Fixed appliances (10),
- Functional appliance/s (5)
- Removable appliance/s (5)

For all patients who were still in active treatment but had not attended an appointment in the last 4 months from the audit date, and given fixed appliance/s, the data is as follows:

- Total patients: 10
- Contactable: 7. Some patients were contacted via their parents. 3 patients were uncontactable because the phone number in the treatment card was no longer valid.
- Of those contactable, the reasons for missing appointments (in general) are:
 - o Studying/staying elsewhere (4)
 - o Do not seem to be bothered/interested in treatment (2)
 - o Parents not aware whether child was with/without braces (1)

DISCUSSION

The data for showed that a small number of 20 patients having active treatment defaulted appointments for more than 4 months and are possibly wearing their appliance/s unsupervised. This represents only 5.5% of the total amount of patients registered for treatment in 3 years and 6.7% of patients who then proceeded to have active treatment. There is a chance however, that these numbers are an underestimate, because this study is retrospective and data was collected from case note entries.

The gender ratio is similar to the general patient characteristics where the ratio of female to male patients failing to attend appointments was almost 2:1.

An opinion that there is no difference in attitudes among female and male patients (or their parents/guardians) that default on appointments should be made with caution due the small number of these patients.

All patients defaulting on treatment were from the Kuantan area. Hence, the assumption that patients from outstation were more likely to default on appointments cannot be suggested from the data.

The average age of treatment commencement of patients defaulting appointments was similar to the general patient treatment start age, so similarly, the assumption that patients beginning treatment at a later age (who are more likely to shift elsewhere for further studies/work) were more likely to default on appointments cannot be suggested from the data. However, perhaps the design of the audit was not specific/sensitive enough to detect this.

Age, gender, distance travelled and other socio-economic factors seem to be reasons for failing appointments in a literature review and failing appointments is then associated with patients discontinuing treatment.² Furthermore, early discontinuation of treatment is associated with a reduced level of treatment outcome.³

10 of the 20 patients who have defaulted appointments for more than 4 months were fitted with a fixed appliance. Those wearing functional appliances/removable appliances are not deemed a major concern because it is assumed that these patients are not wearing them! Those wearing fixed appliance/s are the major concern because patients cannot remove them and unsupervised wear can lead to detrimental effects such as caries, periodontal disease and unwanted tooth movements.

These defaulters wearing fixed appliances were contacted. Those able to be contacted (some via their parents) were offered an appointment. From questioning, it appeared that either the patient was not staying locally anymore and/or was just uninterested/apathetic regarding their treatment. The reasons for this were not identified in this audit. However, perhaps better patient screening, education and selection is needed to ensure that such treatment is only offered to those who are aware, and can make the necessary commitment in having treatment. It is only in the best interest of the patient to delay/deny treatment if they cannot cope with the responsibilities.

CONCLUSION

The aim of this audit was to quantify the number of active orthodontic patients in Klinik Pergigian Jalan Gambut, Kuantan, who had not been attending the clinic for regular review appointments. If any, trends in terms of gender, age at start of treatment and place of residence of these patients were to be identified.

Some conclusions can be made:

1. 20 active patients (out of 299) have defaulted on appointments for more than 4 months from the audit date.
2. No trends in terms of gender, age at start of treatment and place of residence were identified.

RECOMMENDATION

This audit was useful in many ways. It helped in determining the effectiveness of the filing/file retrieval system and case note/case status documentation in the unit. Identification and subsequent contact of unsupervised active patients is also a form of extended patient care. It is recommended therefore to repeat this audit yearly.

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- (B) A Panel of Clinical Consultant covering all the specialities in dentistry.

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Aesthetic Crown Lengthening : A report of 3 cases

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ABSTRACT

The domain of periodontics has changed from being strictly a health service to one where smile enhancement has been brought to the forefront of treatment planning. Excessive gingival display or gummy smile has become a significant aesthetic concern for many patients. This article discusses about “gummy smile” and aesthetic crown lengthening, and presents three case reports of aesthetic crown lengthening.

Key words:

altered passive eruption, aesthetic crown lengthening, internal bevel gingivectomy.

INTRODUCTION

Excessive gingival display or “gummy smile” has become a significant aesthetic dilemma for many patients. “Gummy smile” can be caused by vertical maxillary excess, tooth mal-position or delayed apical migration of gingival margin. Making correct diagnosis is crucial because depending on the cause, the condition should be managed differently.

The essentials of a smile involve the relationship between the three primary components, the teeth, lips and gingiva. The lips form the frame of a smile and define the aesthetic zone. Lip lines have classically been defined as being high, medium or low.¹ In the typical low lip line in a smile, only a portion of the teeth is exposed below the inferior border of the upper lip. The high lip line shows a large expanse of gingiva extending from the inferior border of the upper lip to the free gingival margin. In the medium lip line, gingival margins of maxillary central incisors and cuspids will touch the vermilion border of the maxillary lip. Approximately 1mm of gingiva will be visible between the maxillary lip and the gingival margin of the lateral incisors. The incisal edge of the central incisors and cuspids touch the vermilion border of the mandibular lip and the lateral incisal edge will be 1 to 2 mm above the vermilion border. The height of contour of the gingival margin is at the distal line angle of maxillary central incisors and canines and in the center mesiodistally of the maxillary lateral incisor.²

The degree of scallop of the gingival margin depends on the periodontal morphotype (or) periodontal biotypes. Two different periodontal biotypes have been described in relation to the morphology of the interdental papilla and osseous architecture, either the thin scalloped periodontium or the thick flat periodontium. Thick morphotypes have flat gingival contours and thin morphotypes have scalloped gingival contours.³ The gingival height of contour of the premolars and molars assumes a gradually more occlusal position as it moves posteriorly. Any asymmetry in this arrangement disturbs the sense of balance in the composition and results in an unaesthetic smile. Thus, for proper harmony of the smile, the gingival display should be consistent and proportional from tooth to tooth from the maxillary right first molar to left first molar.

One of the clinical criteria in determining whether vertical maxillary excess or altered passive eruption is responsible for a “gummy smile” relates to the basic shape of the teeth, which is influenced by tooth length and the ratio between tooth length and width (the ideal being approximately 10:8).⁴ If the teeth appears to be somewhat square, meaning that the tooth length appears to be too short as compared with its width, the gummy smile is probably due to altered passive eruption. If the form of tooth appears to be normal and excess soft tissue is exposed below the inferior border of the upper lip, this is probably due to an overgrowth of the maxilla in a vertical dimension or vertical maxillary excess.

Altered passive eruption is an aberration in normal development where a large portion of the anatomic crown remains covered by the gingiva. It results in a tooth shape that is somewhat square instead of a more attractive elliptical or ovoid form. The excess soft tissue tends to be displayed below the inferior border of the upper lip complicating the desired relationship in that it makes a potentially medium lip line into a high lip line. Altered passive eruption has been classified into two distinct types (Type I and Type II) and the type is subdivided into two sub groups, i.e. Type IA, Type IB, Type IIA and Type IIB.⁵

In Type I, gingival margin is incisal or occlusal to the cemento-enamel junction (CEJ) with a wider gingival dimension from the free gingival margin to the mucogingival junction than the generally accepted mean (3 mm). The mucogingival junction is usually apical to the alveolar crest. In Type II, gingival dimension from the free gingival margin to the mucogingival junction falls within the normal range. In this type, all the gingiva is located on the anatomic crown, with the mucogingival junction located at the level of CEJ. In sub group-A, alveolar crest CEJ relationship corresponds to the 2 mm distance, accepted as normal. This distance allows for normal insertion of the gingival apparatus in to the cementum. In sub group-B, alveolar crest is almost at the level of the CEJ. This relationship is frequently observed during the transitional dentition phase of active eruption.

The Treatment Modalities for “Gummy Smile” are as Follows:

“Gummy smile” due to vertical maxillary excess should be treated by orthognathic surgery and orthodontics.⁴ While, “gummy smile” is due to delayed passive eruption it can be treated in the following manner.^{2,4,6}

For Type I sub group-A - gingivectomy, for Type I sub group-B - flap procedure with internal bevel gingivectomy and osseous reduction to maintain 2 mm distance between alveolar crest and CEJ, for Type II sub group-A – a flap procedure with apical repositioning of the flap to preserve the attached gingiva, and for Type II sub group-B – a flap procedure with osseous reduction to maintain 2 mm distance between alveolar crest and CEJ and apical repositioning of the flap to preserve the attached gingiva.

CASE REPORTS

Case 1

A 25 year old female presented with a chief complaint of gummy smile. After clinical and radiographic examination, it was classified as a Type I subgroup-A altered passive eruption in relation to maxillary anteriors (Fig 1a and 1b). The excessive gingival tissue was excised with a number 15BP blade through internal bevel gingivectomy. To create a natural looking gingival contour, the gingival height of contour for central incisors and cuspids were placed just distal to the midline of the tooth and for lateral incisors at the midline of the tooth. The remaining gingival width for maxillary anteriors after gingivectomy was around 4 mm. The distance between CEJ to alveolar crest was 2 mm on the labial aspect after gingivectomy, which is needed to maintain the biological width (i.e. for supra crestal connective tissue attachment and the junctional epithelium to attach to the tooth), for the health of periodontium. A stable aesthetic result was seen 6 months following the crown lengthening procedure (Fig 1c and 1d).

Case 2:

The patient was a 27 year old male who was unhappy with the excessive gingival display on upper right side. A diagnosis of Type II sub group-B altered passive eruption was determined in relation to maxillary right lateral incisor and canine (Fig 2a). Mucoperiosteal flap was reflected from the labial aspect. Neither palatal nor interdental soft tissue was reflected in order to ensure maintenance of interdental papillae. Osseous recontouring was performed to maintain 2mm distance between alveolar crest and CEJ on labial aspect. The mucoperiosteal flap was apically repositioned with a vertical mattress sutures. Periodontal dressing was not applied to avoid compression of the papillae. A 6 months follow up showed the maintenance of aesthetic result following surgery (Fig 2b).

Case 3:

A 24 year old female presented with a chief complaint of “gummy smile”. It was found that the right lateral incisor was missing. A diagnosis of Type II subgroup-A altered passive eruption in relation to the right central incisor and canine (Fig 3a) was determined. The treatment plan for this patient included an internal bevel gingivectomy to reduce the excess amount of gingival display and osseous recontouring was performed on labial aspect to maintain 2 mm distance between CEJ to alveolar crest. Two months after crown lengthening procedure the right lateral incisor was replaced with a porcelain pontic through spring cantilever design using the left root canal treated central incisor as an abutment (Fig 3b).

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Fig 1a: Preoperative view showing Type I sub group-A altered passive eruption.

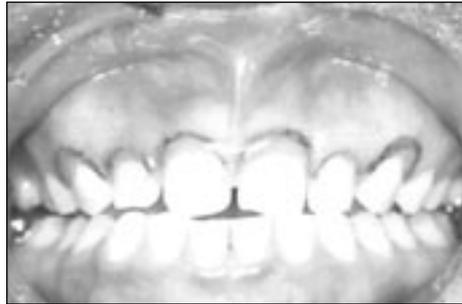


Fig 1b: Line marked on gingiva indicating the amount of gingival excision.



Fig 1c: Postoperative view 6 months after aesthetic crown lengthening.



Fig 1d: Postoperative view 6 months after aesthetic crown lengthening

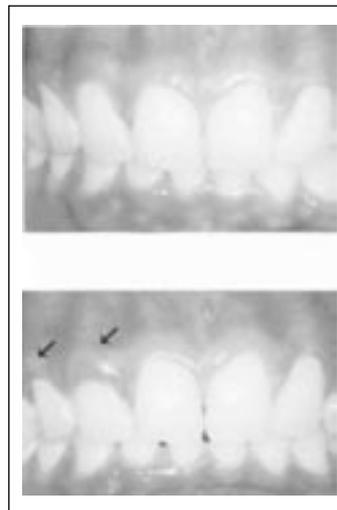


Fig 2a: Preoperative view showing (arrows) Type II sub group B altered passive eruption.

Fig 2b: Postoperative view 6 months after aesthetic crown lengthening.



Fig 3a: Preoperative view showing Type II sub group A altered passive eruption.



Fig 3b: Postoperative view 2 months after aesthetic crown lengthening.



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