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EDITORIAL

DENTAL HEALTH AND TOOTHPASTE

Toothpaste is not a relatively modern phenomenon. It has history as long ago as 3000-5000 BC. According to history Egyptians made dental cream by mixing powdered ashes of oxen hooves with burned egg shells pumice and water (Schwarz, and Wong, 1998). In eighteenth century in England toothpaste introduced to market was packed in a ceramic pot. At the end of the twentieth century pure plastic tube was used to store tooth paste. At present several well-known brands of international and domestic can be seen in the market. The global toothpaste market size was USD 17.75 billion in 2019 and is projected to reach USD 21.99 billion by 2027, exhibiting a CAGR of 3.4% during the forecast period.

Toothpaste market is not price sensitive product and brand loyalty plays an important role in most of the customers. Currently nearly 97% of the population in developed countries uses at least one variety of toothpaste (San, 2012). This gives marketers virtually no space to expand the market with new users. Therefore, value addition to the product is the one of the preferred alternatives to capture the market share.

The toothpaste industry in Sri Lanka is very competitive and most of leading brands are marketed by multinational companies. It can be seen that new product developments and different types of advertisement campaign to capture toothpaste market in Sri Lanka by increasing their budgeted investment for research and development projects.

Tooth decay, though not life threatening, it is potentially an extremely painful disease with the potential to ruin quality of life by making chewing difficult and spoiling the enjoyment of food, along with disastrous effects on facial appearance when the front teeth are affected. The social impact of dental disease in children is such that 51 million schooldays are lost to dental related illness every year!

According to the World Health Organization, worldwide, 60-90 percent of schoolchildren and nearly 100 percent of adults have dental cavities. In Sri Lanka, 63% of six year olds have dental caries. The prevalence in 12 and 35-44 year olds is estimated to be around 30 % and 92% respectively. Few diseases in the world have such a high prevalence. And to make matters worse, a review of epidemiological data from many countries in 2009 suggested that there might be a marked increase in prevalence taking place worldwide.

It is well evident the action of Fluoride in prevention of dental caries worldwide. Reducing demineralization and promote re-mineralization is the primary mechanism of fluoride along with the deactivating cariogenic bacteria on prevention of dental caries.

Researchers have shown that the exposure to optimal level of fluoride for a long time and maintaining a regular low level of fluoride in the oral cavity play an important role with the prevention of dental caries on both children and adults.

Fluoride toothpaste is the most commonly used method of fluoride globally as well as in Sri Lanka as it is convenient, cost effective and has proven in the reduction of dental caries.

There are enough evidence from Cochrane Database systematic reviews, WHO and the International Dental Federation (FDI), highlighting the importance of use of fluoridated toothpaste as illustrated below.

1. Following a review of 74 studies of fluoride toothpaste for the prestigious Cochrane Database of Systematic Reviews in 2003, the authors concluded that “fluoride toothpastes have been widely used for over three decades and remain a benchmark intervention for the prevention of dental caries”.
2. A World Health Organization (WHO) Expert Committee as far back as 1984 concluded that “routine use of fluoride dentifrices is recommended practically everywhere, except for young children living in areas of endemic fluorosis” and that the findings of over 100 clinical trials indicate that fluoridated toothpastes reduce cavities by 20-30 percent.

In a resolution first adopted in 2000 and modified in 2018, affirmed that “regular use of fluoride toothpaste is scientifically recognized as a major means to reduce the prevalence and severity of dental caries and delay its onset in the global population,” and urged all countries to recognize the importance of providing universal access to fluoride toothpaste to fight dental caries.

3. In the UK, Public Health England, an agency of the Department of Health, in 2017, advocated the appropriate use of fluoride toothpaste at least twice daily in adults as well as in children from the moment the teeth erupt into the mouth.

The above represent a small sample of the monumental scientific evidence and unanimous expert opinion validating the twice daily use of a fluoride toothpaste for the prevention of dental caries. Accordingly, it is not surprising that in many countries fluoride toothpastes make up more than 95% of toothpaste market share.

In this backdrop increasing market share of non-fluoride toothpastes sold in Sri Lanka is cause for concern. For example, it would seem that the market share of one brand of toothpaste that

does not contain fluoride has increased from 3.5 percent to 14 percent between 2013 and 2017. It is surprising and indeed ominous if as seems to be the case in Sri Lanka there is an opposite trend towards using non-fluoridated toothpastes to clean the teeth! It is pathetic that few years back a professional College in the field of Dentistry signed an MOU with a toothpaste manufacturing company endorsing a toothpaste that does not contain fluoride.

Any trend towards the aggressive marketing and popularisation of non-fluoride toothpastes in Sri Lanka must be seen as retrogressive and harmful

to dental health. Therefore it is high time that the dental profession including umbrella organization Sri Lanka Dental Association actively address the issue of advertising and marketing and proliferating use of non-fluoridated tooth paste in country.

Dileep De Silva Shyama Banneheka
Co-Editors SLDJ

(Editorial has referred to a Newspaper article written by Prof A.N.I. Ekanayake on Fluoridated toothpaste)

An update on paediatric fiberoptic intubation in maxillofacial surgeries

P.S.K. Nanayakkara

Abstract

Unique differences in the anatomy of airways, makes airway access technically more difficult in neonates and paediatric patients than in adults. Difficult airway access leading to delays in establishing airway together with a higher oxygen consumption rate and limited body oxygen reserves due to a lower functional residual capacity makes a paediatric patient vulnerable for hypoxia during induction of anaesthesia. A difficult airway is defined as a situation where a conventionally trained anaesthesiologist experiences difficulty in performing tracheal intubation or experiences problems with face mask ventilation, or both. Major congenital anomalies in the upper airways like in Pierre Robin Syndrome, Goldenhar syndrome makes conventional direct laryngoscopy & intubation and sometimes even manual ventilation extremely difficult or impossible. Congenital abnormalities of the upper airways associated with some of the syndromes makes even attempts at conventional laryngoscopy and intubation a very high-risk procedure with increased mortality and severe morbidities like permanent hypoxic brain injury. Therefore fibre-optic intubation under gaseous induction and maintenance of anaesthesia is the sole safe option in a paediatric patient with an expected extreme difficult airway particularly with restricted mouth opening. However, myocardial depression, vasodilatation, respiratory depression, hypothermia and other adverse effects due to anaesthetics deepens the crisis that a paediatric anaesthetist faces with a difficult

airway. Bleeding from the nose, laryngeal trauma, deranged cardiovascular parameters like severe tachycardia and elevated blood pressure are known complications of fibre-optic intubation.

Introduction

Gaining airway access is always a challenge in paediatric anaesthetic practice in maxillofacial surgeries. Unique differences in the anatomy of neonatal and paediatric airways makes airway access more technically difficult than in an adult¹. Difficult airway access leading to delays in establishing airway together with a higher oxygen consumption rate and limited body oxygen reserves due to a lower functional residual capacity makes a paediatric patient vulnerable for hypoxia during induction of anaesthesia.

The smaller the child the greater the differences in the airway compared to an adult. Small dimensions of the airway, anteriorly and higher placed larynx guarded by a long and intrinsically floppy epiglottis with a short neck, disproportionately large tongue with a small mandible and narrow cricoid makes paediatric airway management very difficult. Moreover, the presence of congenital airway abnormalities and craniofacial anomalies have further complicated the paediatric airway management¹. Furthermore, multiple tracheal intubation attempts, with inadequate oxygenation in-between the attempts ending in a failed or delayed intubation have resulted in adverse consequences such as hypoxemic brain damage, cardiac arrests and even deaths^{2,3,4,5}. Myocardial

depression, vasodilatation, respiratory depression, hypothermia and other adverse effects due to anaesthetics deepens the crisis that a paediatric anaesthetist is facing with a difficult airway. Several conditions have been indicated as predictors of difficult intubation in paediatric patients including restricted head extension, small and distorted mandibular space, increased tongue size, craniofacial dysmorphism, reduced distances from lower lip to the chin and tragus of the ear to the mouth⁶. Therefore, the airways of this kind of vulnerable patient populations should be secured by providing appropriate ventilation and oxygenation with an endotracheal tube⁷. Simultaneously, the emphasis should be given to the intubation techniques with high success rates with the minimum number of attempts if not for the first attempt to avoid complications like hypoxia, injuries to airway, face, eyes & mouth, airway oedema and bleeding into the airway. A common problem with repeated attempts at intubation is mucosal injury, leading to submucosal swelling and bleeding in to the airway making intubation more difficult or forcing the anaesthetist to abandon attempting at intubation and resorting to salvaging techniques. Fiberoptic intubation (FOI) is likely to be advantageous in disrupted and difficult airways where the management is challenging and considered to be a substitute to direct laryngoscopy or blinded nasotracheal intubation⁸. This technique is the sole safe option in a paediatric patient with an expected extreme difficult airway particularly in restricted mouth opening.

Indications for paediatric fiberoptic intubation (FOI)

A difficult airway is defined as a situation where a conventionally trained anaesthesiologist experiences difficulty in performing tracheal intubation or experiencing problems with face mask ventilation, or both⁹. Difficult airway is more commonly associated with inherent anomalies and syndromes, trauma, infection, swelling and burns¹⁰. When anaesthetists are confronted with this kind of challenging situations

fiberoptic intubation is known to be the most favoured method to stabilize the airway¹¹. Many congenital or acquired syndromes/ diseases requiring FOI have been reported in case reports and this include but not limited to Smith-Lemli-Opitz syndrome (SLOS)^{12,13} Klippel-Feil Syndrome(KFS)^{14,15} Cystic hygroma¹⁶ Pierre Robin sequence^{17,18}, Goldenhar syndrome, Trisomy 21 or Down's syndrome, Freeman-Sheldon syndrome, Treacher-Collins syndrome, mucopolysaccharidosis type I (MPS I, Hurler syndrome), temporomandibular joint (TMJ) ankylosis, submandibular abscess and Schwartz-Jampel syndrome. Other than the above-mentioned diseases, carpenter syndrome, Cruzon disease, juvenile-onset rheumatoid arthritis, cervical spine disorders including Morquio's syndrome, achondroplasia, isolated odontoid anomalies, spondyloepiphyseal dysplasia¹⁴ are some of the other conditions in which the airway obstructions are seen and hence fiberoptic intubation is required.

In these congenital or acquired cases, the patients are presenting with dysmorphic facial features and associated anomalies which challenge the anaesthesiologists to manage the airway properly. Typical dysmorphic facial features in SLOS include micrognathia, cleft palate, small and hard tongue.

Procedure of FOI

When it comes to dealing with a difficult airway in adults, doing an elective tracheostomy under local anaesthesia or performing an awake fiberoptic intubation are the preferred safe methods of stabilizing of airway. This however is not practicable with paediatric patients and general anaesthesia is essential before making any attempts at intubation. Induction and maintenance of anaesthesia with volatile agents would improve patient safety by preservation of spontaneous breathing and preservation of airway reflexes to an extent to prevent pulmonary aspiration. Fibre-optic intubation could be performed either through mouth or nose. For oral & maxillofacial

surgeries or when mouth opening is restricted nasal fibre-optic intubation is preferred to leave room for the surgeons. In addition, nasal intubation is believed to be easier because the natural nasal tract guides the fibre-scope down to the larynx. However, chances for bleeding into the airway is higher with disruption of the delicate nasal mucosal integrity.

Infants and children usually desaturate rapidly if any airway obstruction occurs due to their high metabolic rate¹⁹. This is also accentuated by the reduced oxygen reserves due to relatively low functional residual capacity. Therefore, it is essential to take additional precautions during the procedure like insufflation of oxygen through a nostril during oral fibre-optic intubation. In the case of nasal intubation oxygen insufflation can be done through the other nostril. Nares are relatively narrow and offers about 50% of the airway resistance making oxygenation more difficult through nose. If intravenous sedatives such as midazolam or fentanyl are to be used those should be titrated cautiously in order to minimize the respiratory depressant effects and obtunding airway reflexes. Sedatives can be used as pre-medications to facilitate the induction of anaesthesia and can be introduced intravenously, orally, intramuscularly, intranasally or rectally. Generally intravenous agents like Propofol or Thiopentone Sodium are discouraged before stabilizing airway due to the risk of losing airway. In the case of an absence of intravenous line, inhalational induction of anaesthesia can be performed with sevoflurane, oxygen, and nitrous oxide. When nasal fibreoptic intubation is to be performed, lidocaine and phenylephrine are applied in nasopharynx in order to prevent any bleeding which may obstruct the proper visualization through the bronchoscope. If oral FOI is the preferred method, a laryngeal mask airway (LMA) can be utilized which is known as an excellent conduit for FOI while effectively oxygenating and ventilating the patient. In nasal FOI, one nostril could be exploited to advance a nasopharyngeal tube for general anaesthesia,

oxygenation and to monitor the ventilation with capnometry while the other nostril is occupied for intubation. Before advancing the bronchoscope, the pharynx should be properly suctioned to remove secretions and the bronchoscope and the endotracheal tube (ETT) should be adequately lubricated. Lubrication facilitates forward movement of the scope and will minimize traumatizing the mucosa. The smallest endotracheal tube accommodated by commonly used fiberscopes is 4.5mm inner diameter. Scopes lit by a portable battery light source offers more manoeuvrability of the scope compared with a cabled light source from a main-powered light source. Viewing through the eye- piece of the scope is becoming an obsolete practice with availability of high-definition medical type monitor which gives a magnified picture with a better picture quality.

Fibreoptic scope loaded with ETT is inserted through the vocal cords and placed in to the trachea progressively. Once the tracheal lumen is reached, confirmed after seeing the carina & C-shaped cartilages, the ETT is railroaded into the trachea¹⁴. After successful completion of the procedure, the LMA, bronchoscope and airway equipment used for oxygenation though the nostril are removed carefully.

FOI through a supraglottic airway (SGA) device is possible with a good mouth opening. This SGA is known to be beneficial for paediatric patients who are frequently encountered with hypoxemia, by means of facilitating continuous oxygen supply and ventilation while acting as a channel for FOI. Moreover, SGA is found to be alleviating the upper airway obstruction and enhancing the laryngeal view with a fibreoptic bronchoscope.

Complications

Like all other medical procedures, Fibreoptic intubation has its own complications. Since only the curvature of the tip of the fiberscope can be controlled, but not the remaining part of the fiberscope, it can cause injury to the airway

while introducing. It is found that the serious laryngeal injuries can occur while the tube is being advanced through the larynx during fibrescopy. Fibreoptic nasal intubation is considered to be more invasive than the Fibreoptic oral intubation, since both the endotracheal tube and the fibreoptic bronchoscope are advanced through the nasal route and due to the longer time required with nasal intubation. Significantly increased blood pressure has been observed after laryngoscopic nasotracheal intubation than the laryngoscopic orotracheal intubation²⁰. Bleeding from the airway is more with nasal intubation.

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Dental management of patients with multiple myeloma: a clinical update

V.A. Gayathry, S. Shanmuganathan

Abstract

Multiple myeloma (MM) is a rare haematological malignancy characterized by the proliferation of plasma cells in the bone marrow and abnormal production of M protein. Jaw involvement has been reported in about 30% of cases. Orofacial manifestations of MM such as gingival swelling, lower lip paraesthesia, teeth mobility and displacement, pathological lesions and pathological mandibular fracture may helpful in the diagnosis. A dental surgeon should be aware of these features because a gingival swelling can imitate a dental abscess. MM patients have complications due to the disease or its treatment. Bisphosphonate is one of the anti-angiogenic drugs used in the management of MM and it can cause Medication-related osteonecrosis of the jaw (MRONJ). MRONJ risk assessment should be done prior to treatment with any antiangiogenic or antiresorptive drugs and necessary prophylactic dental treatment should be done. Precautions should be taken to prevent complications during dental treatment such as increased bleeding and postoperative infection. Antibiotic prophylaxis is recommended prior to any invasive dental treatment in MM patients.

Introduction

Multiple Myeloma (MM) is a relatively rare haematological malignancy and it accounts for 1% of all cancers and 10% of haematologic malignancies. Its annual worldwide incidence

estimated to be 6-7/100000^{1,2,3}. It is the second most common haematological malignancy and characterized by the proliferation of plasma cells in the bone marrow and abnormal production of immunoglobulin monoclonal paraprotein (M Protein)⁴. MM has a male predilection and the median age of patients at the time of diagnosis is 65 years³. MM was first described in 1844 by Samuel Solly and it is part of a spectrum of disease ranging from Monoclonal Gammopathy of Unknown Significance (MGUS) to plasma cell leukaemia². Knowledge of MM is important in dental surgery as oral manifestations of MM may rarely present as a first sign of the disease⁵. A dental surgeon should be aware of the oral manifestation of MM and know when to refer to oral & maxillofacial specialty centres. In addition, jaw involvement of MM may be misdiagnosed as a dentoalveolar abscess and can be mismanaged. This article will summarize the epidemiological, aetiological, clinical features and current treatments of the MM and describes the dental management in MM patients.

Aetiology & Pathogenesis of Multiple Myeloma

The aetiology of MM is still uncertain although obesity, family history and exposure to radiation have been associated with increased risk of developing MM⁶. In addition, there is evidence that suggests mutations in *CMYC*, *NRAS* and *KRAS* may be related with the development of MM⁷. Abnormal proliferation of the plasma cells

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in the bone marrow results in the displacement of other hematopoietic cells and myelosuppression which leads to anaemia, leukopenia and thrombocytopenia⁸.

Clinical Manifestations of Multiple Myeloma

Usually, patients with MM presents with bone pain, pathological fracture, weakness due to spinal cord compression, haematology complications such as anaemia, increased bleeding tendency and recurrent infection often with *streptococcus pneumoniae*. They may have signs of hypercalcaemia, renal failure and neuropathies⁶. Orofacial manifestations of MM are swelling, macroglossia, gingival bleeding, paraesthesia of lower lip, mobility and migration of the teeth, radiolucent lesions and pathological fracture of the mandible. Jaw bone involvement was reported in 18-30% of cases⁵.

Diagnosis of Multiple Myeloma

The Diagnosis of MM is usually made by routine investigations when patients present with unrelated complaints. In one-third of patients, MM is diagnosed after a pathological fracture involving the axial skeleton. Lateral skull radiographs (*Figure 1*), thoracic and

lumbar spine radiographs (*Figure 2*) and dental panoramic radiographs are useful in diagnosis. A full blood count may reveal suppression of normal haematopoiesis. Usually, in the blood picture of MM patients, the rouleaux formation of red blood cells can be seen. Serum protein electrophoresis is useful to identify abnormal globulin protein. Bone marrow biopsy is used for the confirmation of diagnosis. According to the diagnostic criteria of International Myeloma Working Group, following both criteria must be met to diagnose MM³.

- 1) Clonal bone marrow plasma cells > 10% or biopsy-proven bone / extramedullary plasmacytoma
- 2) Any one or more of the myeloma defining events
 - i. Evidence of end-organ damage that can be attributable to the underlying plasma cell proliferative disorder (CRAB)
 - a. Hypercalcaemia
 - b. Renal failure
 - c. Anaemia
 - d. Lytic bone lesion
 - ii. Clonal bone marrow plasma cell > 60%
 - iii. Involved: uninvolved serum free light



Figure 1. Multiple Punched-out Osteolytic Lesions on the Lateral Skull Radiograph in a patient with Multiple Myeloma



Figure 2. Wedge type fracture in L4 vertebrae in a patient with Multiple Myeloma

chain ratio > 100

- iv. Focal lesion in magnetic resonance imaging (at least 5mm in size) > 1

Dental Management on Multiple Myeloma patients

Dental management of MM patients can be complicated due to the disease or treatment related problems. Pale oral mucosa, recurrent oral ulcers, angular cheilitis and burning mouth syndrome can be present due to anaemia⁹. Leukopenia can result in recurrent infections and increase bleeding tendency can be due to thrombocytopenia, Platelet dysfunction, abnormal coagulation or hyper-viscosity of blood which is caused by accumulation of abnormal paraprotein in the blood. Intraoral bleeding may present as petechiae, ecchymosis or rarely haematoma formation. Usually, they do not need treatment⁸.

The routine dental treatment where bleeding is not anticipated generally can be provided even with severe thrombocytopenia (<10,000/mm³) without transfusion. But for surgical management, routine blood investigation such as full blood count, bleeding time, prothrombin time and activated partial thromboplastin time should be obtained and according to the extent of the surgery, platelet transfusion should be planned on

the day of procedure. Simple dental extractions can generally be managed by an experienced clinician with localized measures even with low platelet count (<15,000/mm³)⁸.

MM patients are more prone to develop dental infection generally atypical in nature. This is due to malignancy or secondary to myelosuppressive chemotherapy. Recurrent infections or newly acquired infections and reactivation of the latent infections are common due to compromised lymphocyte function and / or neutropenia. Elimination of sources of odontogenic infections prior to the treatment of MM is mandatory to prevent complications. Oral hygiene instructions should be given and scaling & curettage, restoration and extraction of teeth with poor prognosis should be done.

Primary infections or reactivation of herpes simplex viruses is common among MM patients. Oropharyngeal candidosis is the common opportunistic fungal infection that occurs in these patients due to an immunocompromised state⁸. It may present in the form of pseudomembranous, erythematous, hyperplastic types, angular cheilitis and burning mouth syndrome (*Figure 3 & 4*). Topical azole or nystatin lozenges for 7 to 14 days can be adequate. In severe forms, systemic



Figure 3. Pseudomembranous candidiasis of the palate (Source: "Oral thrush. Aphthae. Candida albicans.", Centres for Disease Control and Prevention, Centers for Disease Control and Prevention licensed under Public Domain)



Figure 4. Angular cheilitis (Source: "Angular cheilitis.", Centers for Disease Control and Prevention, Centers for Disease Control and Prevention licensed under Public Domain)

antifungals are indicated such as fluconazole. Aspergillosis, zygomycosis & histoplasmosis should be suspected in patients with non-healing ulcer and if confirmed, intravenous antifungals such as amphotericin B, itraconazole are indicated⁸.

Medullary bone involvement is common in the axial skeleton such as pelvis, vertebrae, ribs and skull. Mandibular involvement is reported in 10-30% of cases and usually, it involves posterior mandible because of high hematopoietic activity⁹. Dental radiographs such as intraoral periapical, occlusal radiograph and dental panoramic radiographs may help to identify jaw involvement. Radiological features of MM involving the skeletal system can be three types: 1) normal findings, when there is mild bone resorption 2) Punched-out osteolytic lesions in different sizes with ill-defined margins due to focal proliferation of plasma cells 3) generalized bone rarefaction and osteoporotic changes due to diffuse proliferation of plasma cells¹⁰.

Extra medullary involvement of plasma cell malignancy may present with a soft, fluctuant gingival swelling which can be mistreated as a dental abscess¹¹. Therefore, a thorough clinical history and appropriate investigations should be taken before any dental treatment. Systemic amyloidosis can be associated with multiple myeloma and may present as macroglossia¹².

MM patients have a risk of developing of osteonecrosis of the jaw when they have radiotherapy or intravenous bisphosphonate treatment. In 2014, The American Association of Oral and maxillofacial surgeons (AAOMS) introduced the term medication-related osteonecrosis of the jaw (MRONJ), which is previously known as Bisphosphonate related osteonecrosis of the jaw¹³. The drugs which are associated with MRONJ are bisphosphonate, denosumab, bevacizumab and sunitinib (anti-angiogenic drugs)⁸. The reported incidence of MRONJ in MM patients was 7% to 11% and oral

surgery is the commonest risk factor. MRONJ is more frequently occurs in mandible (73%) than maxilla 22.5%^{14, 15}.

Bisphosphonate (BP) has an anti-angiogenic effect and long-term treatment results in compromised blood supply to the maxilla and mandible. BP inhibits osteoclast which results in reduced bone turnover & remodelling. After dental extraction, the exposed bone cannot resist the oral microflora due to the poor healing ability due to compromised blood supply and reduced bone metabolism. Therefore, the wound becomes infected and progresses into osteomyelitis and eventually develops osteonecrosis of the jaw⁸.

Therefore, MM patients should be referred for dental assessment prior to chemotherapy or radiotherapy. Dental surgeons have an important role in the prevention of MRONJ in MM patients who are at risk. Studies have proven that ONJ can be preventable if the dental assessment and necessary preventive measures are taken prior to the treatment for MM. During the dental assessment, the risk level of the MM patients to develop MRONJ should be assessed. To assess the risk level a dental surgeon should get the following information during the initial discussion with the physician who is treating the MM patient:

- I. Prior exposure to the drugs which are associated with MRONJ
- II. The time frame for initiating treatment (is there an opportunity to perform the dental treatment or is there a need to start therapy immediately?)
- III. What is the dose and duration of the drugs (high or low dose, short or long duration)?
- IV. Prognosis of the patient and his/her general health status
- V. Previous treatment with drugs which have potential oral side effects (e.g., Corticosteroids, chemotherapy)

MM patients who are at risk of MRONJ development can be mainly categorized into

low and high-risk groups (*Table 1*). High-risk group patients should undergo a complete dental assessment including dental radiography. In addition, the dental surgeon should inform the MM patients about their MRONJ risk level and complications. These patients should be advised to maintain good oral hygiene and must be educated to identify the symptoms of the MRONJ. If there is a doubt about the risk level of MRONJ, the dental surgeon may contact the treating physician or can refer to an Oral and maxillofacial surgeon (OMFS)¹⁶ (*Figure 5*).

Usually, it is advisable to complete prophylactic

dental treatment before starting radiotherapy or BP/Denosumab therapy. Proper oral hygiene instructions should be given to the patient including correct brushing techniques and healthy dietary habit instructions. Prophylactic dental treatment may include extraction of partially embedded teeth, grossly carious teeth and septic roots. Conservative endodontic treatment or prosthodontic treatment can be done for teeth with a good prognosis. Periodontal stabilization splints may be indicated for teeth with grade 1 or 2 mobility in patients with good oral hygiene and extraction is preferred for such teeth in patients with poorly maintained oral hygiene¹⁶.

At Low Risk	Prevention - Prior to the Treatment		At High Risk
	Screening visits are not required <ul style="list-style-type: none"> Preventive dental visits as for general population 	Frequent screening visits are indicated <ul style="list-style-type: none"> Patient education on maintaining good oral hygiene and identification of MRONJ Detect and treat periodontal pockets with occult infection Extraction of teeth with poor prognosis Check and correct ill-fitting dentures Encourage smoking cessation 	
	Prevention - During the Treatment		
	Maintain optimal dental health by prophylactic dental cleaning, tooth restoration, non-traumatic dental treatments and providing oral hygiene instruction		
	No special precautions are needed for dental treatments	Expert advice is required for invasive dental treatments <ul style="list-style-type: none"> Use prophylactic antibiotics in unavoidable procedures Refer to OMFS or specialist dental surgeon in case of unexplained symptoms are present 	
If MRONJ is suspected			
<ul style="list-style-type: none"> Refer to OMFS or oral oncology center with experience in treating MRONJ Start antibiotic oral rinse (0.12% Chlorhexidine mouthwash three times daily) Start empirical broad-spectrum antibiotics (amoxicillin with clavulanic acid 500-125mg three times daily) 			

Figure 5. Management for MRONJ risk assessed patients

Table 1. MRONJ risk assessment

Factors	Low-risk group	High-risk group
Treatment regimen	Low-dose	High-dose
Treatment duration	< 3 years	>3 years
MRONJ risk factors*	Absent	Present

* Previous exposure to bisphosphonate/denosumab, use of corticosteroids/ chemotherapy/ angiogenesis drugs, radiotherapy to head and neck, poor oral hygiene, periodontitis, ill-fitting dentures, smoking, comorbidities such as diabetes mellitus, anaemia

It is recommended to do a prophylactic dental treatment at least one week before the treatment. All invasive dental treatment should be done under antibiotic prophylaxis and suturing can be done to prevent bone exposure. Invasive dental procedures should be avoided for patients who have been on radiotherapy or intravenous BP therapy. If extraction is necessary, it should be done with minimal bone exposure. Dental implants are best avoided in MM patients although BP has a positive effect on osteointegration⁸.

Treatment of MRONJ is a demanding challenge for clinicians and an appropriate treatment is still

to be decided. The primary goals of the treatment of MRONJ are controlling secondary infection, prevent the progression of the necrosis of the bone & pain management. If patients presented with a non-healing wound, initially ensure the diagnosis according to the history and examination.

Radiological investigations are helpful in diagnosis and treatment planning (digital panoramic tomogram, Computed tomography). Mainly, there are two types of treatments available for MRONJ: Conservative and surgical (less or more advanced) and five stages of MRONJ are specified by *Ruggiero et al*¹³(Table 2).

Table 2. Stages of MRONJ and Management

MRONJ category	Clinical Features	Management
At Risk	Patients who have history of antiangiogenic or antiresorptive therapy	<ul style="list-style-type: none"> • Patient education regarding their risk level and identification signs and symptoms of MRONJ • Local risk factor control • Regular follow-up
Stage 0	No evidence of bone exposure but nonspecific clinical symptoms and radiological changes are present	<ul style="list-style-type: none"> • Systemic management with antibiotics and analgesics when indicated • Local risk factors control • Close monitoring
Stage I	Presence of exposed and necrotic bone or fistula that probes to the bone in asymptomatic patients and no evidence of infection.	<ul style="list-style-type: none"> • antiseptic mouthwash (0.12% Chlorhexidine) • No immediate operative treatment is required
Stage II	Presence of exposed and necrotic bone or fistula that probes to the bone with evidence of infection (pain & erythema) and with or without purulent discharge.	<ul style="list-style-type: none"> • Systemic antibiotics and analgesics • Antibiotic mouthwash • Reduction of colonized, necrotic bone volume when there is failure of treatment due to biofilm formation

Stage III	Presence of exposed and necrotic bone or fistula that probes to bone in patients with pain, infection and one or more of the followings: ✓ <i>Extraoral sinus</i> ✓ <i>Necrosis extends beyond the alveolar ridge (inferior border of the ramus of the mandible, sinus floor or zygoma in the maxilla)</i> ✓ <i>Pathological fracture</i> ✓ <i>oral-antral /oral-nasal fistula.</i>	<ul style="list-style-type: none">• Systemic antibiotics and analgesics• Antibacterial mouthwash• Surgical management for long term palliative control of infection and pain
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Conservative management includes pain control and infection control with systemic treatment and antibiotic mouth rinse. The most widely used antibiotics for MRONJ are amoxicillin with or without clavulanic acid 500mg/1g, Clindamycin 300mg, azithromycin 500mg and metronidazole with betalactams¹⁷. Higher success rates of antibiotic therapy have been reported in combination with other conservative treatment modalities such as ozone therapy, hyperbaric oxygen therapy and low-intensity laser therapy. Pentoxifylline and α -tocopherol can be suggested to assist antimicrobial therapy in the early stages of MRONJ¹⁷.

There are two types of surgical managements available for MRONJ: 1) Conservative surgical debridement 2) Resective or extensive surgery. Conservative surgical treatment involves the removal of necrotic bone (sequestrectomy) and / or superficial debridement of necrotic bone with antimicrobial drugs and mouthwash. Resective surgery is indicated in severe symptomatic cases of MRONJ such as a pathological fracture or extensive ONJ beyond the alveolar bone region¹⁸.

Conclusion

Invasive dental management in patients with multiple myeloma can be complicated by the disease or its treatment. Therefore prior to any invasive dental treatment, a proper history should be obtained and necessary examination and appropriate investigations should be done. Dental assessment and treatment should be done prior to radiotherapy or bisphosphonate therapy to allow

healing and prevent osteonecrosis of the jaw. Invasive dental procedures should be done with antibiotic prophylaxis to prevent osteonecrosis of the jaw. Patients, who are at risk of developing medication-related osteonecrosis of the jaw, should be educated regarding the risk and regular dental assessment is indicated.

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A tracer study of dental surgeons with MSc (Community Dentistry) qualification offered by the Post Graduate Institute of Medicine, Sri Lanka

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Abstract

Objectives: The aim of this study was to determine the career paths chosen by dental surgeons with MSc in Community Dentistry, perceived relevance of the MSc programme to their present career and the sociodemographic factors associated with the decision to further their studies in the specialty of Community Dentistry.

Methods: A mixed-method was used for data collection. A descriptive cross-sectional study was conducted among those who had obtained the MSc degree in Community Dentistry from the PGIM. The second part consisted of in-depth telephone interviews with a selected group of MSc holders to obtain information about their perceptions regarding the MSc programme.

Results: Seventy-five percent of participants were females. Around 65% of the sample had proceeded to follow the Doctor of Medicine (MD) programme in Community Dentistry with a view of obtaining specialist status in the discipline. Of the 35% who did not proceed to follow the MD programme after the MSc, nearly 27% were currently practicing clinical dentistry. Family commitments were cited as the main reason for not continuing further studies. During the in-depth interviews, the participants had indicated that the MSc programme should give more emphasis to

practical aspects of Public Health Dentistry.

Conclusion: The study revealed that the majority of dental surgeons with the MSc in Community Dentistry had proceeded to follow the MD in Community Dentistry in order to obtain specialist status in the discipline. However, a few had reverted to clinical dental practice.

Key words: MSc (Community Dentistry), tracer study, career path.

Introduction

Graduation is a significant milestone in one's life. Having acquired a Bachelor's degree, an individual's career pathway can take various routes and following a postgraduate study programme is one of the most common pathways that many opt for. There are several reasons for pursuing postgraduate studies and the main reason is to develop and enhance knowledge and skills in order to secure better career prospects. Further, postgraduate education satisfies the intellectual curiosity and personal growth of an individual¹.

Many universities and institutions offer postgraduate programmes for medical/dental graduates leading to Diplomas, Master's and Doctoral degrees. These institutions periodically conduct tracer studies to obtain feedback from

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their alumni to improve the quality of the programmes^{2,3}. Ndungutse (2005) conducted a tracer study to determine the reasons for unemployment among Ugandan medical graduates who had graduated from medical schools between 1980 and 2001. The findings revealed that medical graduates lacked computer, practicals and private practice management skills to match the labour market demands⁴. A study conducted among dental graduates in Philippines had assessed the relevance of the dental curriculum and the knowledge, skills and attitude acquired by the graduates for their employment. According to the results, the curriculum and knowledge gained were highly relevant to their practice. Further love for god, honesty and truth, professional integrity and leadership were also mentioned as some attributes gained by the graduates that were beneficial for the practice of the profession⁵.

In Sri Lanka, the Post Graduate Institute of Medicine (PGIM) of the University of Colombo which was established 1976, is the main body responsible for providing postgraduate education for medical/ dental graduates^{6,7}. The PGIM currently offers various postgraduate programmes leading to Diplomas, Master's and Doctoral degrees in different specialties of medicine and dentistry. A postgraduate trainee who successfully completes the Doctor of Medicine (MD) degree programme in a given specialty would be eligible to practice as a specialist in that field in both the public and private health sectors of Sri Lanka.

With regards to dentistry, the PGIM offers several Diplomas, Master's and Doctoral degree programmes and the Masters in Community Dentistry is one such programme. The aim of this programme is to offer training in the principles and practice of public health including dental public health in order to equip dental surgeons with knowledge, attitudes and skills required to function as efficient and effective dental public health practitioners within the framework of the community dental services of Sri Lanka⁷. The MSc in Community Dentistry is a pre-requisite

to follow the Doctoral programme in Community Dentistry. The Master's programme in Community Dentistry has been conducted since 1987 and its curriculum had been revised on several occasions. However, to the best of knowledge, there is no evidence to indicate that these revisions have been based on comprehensive tracer studies.

Therefore, the aim of this study was to determine the career paths chosen by dental surgeons with the MSc in Community Dentistry, perceived relevance and benefits of the MSc programme to their present career and sociodemographic factors associated with the decision to further their studies in the specialty of Community Dentistry.

Methods

Ethical clearance for this study was taken from Ethics Review Committee, Faculty of Medicine, University of Colombo (Ref no- EC-20-034). A mixed method approach was used in the design of this study. The first part consisted of a descriptive cross-sectional study conducted among those who had obtained the MSc degree in Community Dentistry from the PGIM. The second part consisted of in-depth interviews conducted via telephone with a group of 10 selected participants. The data were collected using a self-administered questionnaire and an in-depth interview. The questionnaire was developed by the first author following a critical review of the literature on the subject. The draft questionnaire developed in English was then piloted among two dental surgeons who had obtained the MSc degree in Community Dentistry prior to year 2000 and modifications were made based on their comments. The final questionnaire included items to obtain information about socio-demographics, job placement profiles, relevance and benefits of the MSc degree to the professional career. The questionnaire was developed on Google Form.

The in-depth interview conducted via telephone and was based on a semi-structured questionnaire to obtain information about the participant's perceptions about the relevance of the MSc

(Community Dentistry) to their professional career, gaps in the MSc programme and recommendations for improvements. The interviews were recorded.

The study population consisted of dental surgeons who had successfully completed the MSc programme in Community Dentistry offered by the PGIM, Colombo between year 2000 and 2019. The list of names of these dental surgeons was obtained from Post Graduate Institute of Medicine, Colombo. According to the information obtained from the PGIM, 68 dental surgeons had successfully completed the MSc programme in Community Dentistry between 2000 and 2019 and all 68 were included in the first part of the study. Of the total sample of 68, 10 participants were selected for the in-depth interviews; five respondents were selected from those who had obtained the MSc degree in Community Dentistry and continued to follow the doctoral programme in Community Dentistry while the other five were selected from those who had not continued their postgraduate studies beyond the MSc level.

All 68 dental surgeons selected to be included in the study were contacted by telephone and email and their co-operation for participation was sought. The questionnaire was developed on Google form and the participants were sent the link to Google form via e-mail and WhatsApp. Reminders were sent via e-mail every week and telephone calls were given twice a month.

Information sheet and consent form were attached with the google form. The information sheet included the telephone number of the principal investigator and e-mail addresses of the co-investigators so that the participants could contact them for any inquiries. Those who gave their consent for participation were requested to respond to the questionnaire.

Statistical Package for Social Sciences for windows version 21 (SPSS) and Microsoft Excel were used for data analysis. If the year of

obtaining the MSc degree was not included such questionnaires were excluded from analysis. Data were presented in terms of descriptive statistics; frequencies. Chi square test and Fisher exact tests were used to assess bivariate associations.

Data obtained through the interviews were categorized into four themes namely; benefits of the MSc programme to the professional career, limitations of the MSc programme, recommendations for improvement of the MSc programme. Further as the PGIM is currently having discussions on whether to amalgamate the course content of the MSc programme with the Doctor of Medicine (MD) programme in Community Dentistry and offer the MD degree only, the opinion of the participants was sought on this matter as well. The data were presented according to the above thematic areas.

Results

Of the total of 68 who had obtained the MSc degree in Community Dentistry, only 44 responded giving a response rate of 64.7%. The sample consisted mainly of Sinhalese females residing in the Western province (Table 1).

Table 2 shows the status of MSc holders as at year 2020. Of the 44 respondents, 29 had (65.9%) proceeded to follow the Doctor of Medicine (MD) programme in Community Dentistry. Of these twenty-nine, 8 respondents had completed the MD programme and currently function as Board certified Consultants/Acting Consultants in Community Dentistry in the public health sector of Sri Lanka while 10 respondents were following different stages of the MD programme. Further 15 respondents from the total sample (34.1%) did not proceed to follow the MD programme.

Table 3 shows the reasons for not proceeding to follow the MD programme. The majority (46.7%) cited family commitments and personal reasons for not following the MD programme.

Table 1. Socio demographic profile of the sample (N=44)

Socio demographic profile		N	%
Sex			
	Male	11	25
	Female	33	75
Ethnicity			
	Sinhala	42	95.5
	Tamil	2	4.5
Permanent residence in 2020			
	Western province	35	79.5
	Other provinces	9	20.5
Current work station			
	Western province	36	81.8
	Other provinces	8	18.2

Table 2. Status of MSc Community Dentistry holders as at year 2020 (N=44)

Status in 2020	N	%
<i>Proceeded to follow the MD Programme to obtain specialist qualifications in Community Dentistry after the MSc</i>	29	65.9
Board certified Specialists in Community Dentistry/acting specialists	8	27.6
Senior Registrars	5	17.2
Registrars	14	48.3
Awaiting to follow the MD programme	1	3.4
Left programme to follow a PhD programme overseas	1	3.4
<i>Did not proceed to follow the MD programme after the MSc</i>	15	34.1
Clinical dental practice only	4	26.7
Both clinical dental and public health practice	4	26.7
Dental public health practice only	7	46.7

Table 3. Reasons for not proceeding to follow the MD programme after obtaining the MSc degree (N=15)

Reasons for not proceeding to follow the MD programme	N	%
Family commitments/personal reasons	7	46.7
Could not get through the selection examination for MD programme	1	6.7
Permanent residence far away from Colombo	1	6.7
Desire to engage in clinical dental practice rather than dental public health	3	20
Less career opportunities compared to other MD programmes	3	20
Total	15	100

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Table 4. Perceived relevance of the MSc Community Dentistry programme to career

Perceived relevance of the MSc degree to career	N	%
For critical analysis of scientific evidence	25	19.4
Useful for multidisciplinary collaboration	39	30.2
Useful to develop leadership skills in public health	33	25.6
For research	32	24.8
Total	129	100.0

* Multiple responses were allowed

Table 5. Perceived Benefits of the MSc degree for career

Benefits of possessing the MSc degree in Community Dentistry to career	N	%
Knowledge gained helpful to function effectively and efficiently at grass root level	27	47.4
Helpful for programme planning	5	8.8
Helpful in educating the public	3	5.3
Promoted to a higher grade in the service	4	7.0
Ability to conduct research and improved computer literacy	9	15.8
Obtained knowledge about concepts of prevention and practice prevention in the field	9	15.8
Total	57	100.0

* Multiple responses were allowed

Table 6. Associations between sociodemographic factors and whether or not proceeded to follow the MD programme (N=44)

Variable	Did not proceed to follow the MD programme		Proceed to follow the MD programme		p value
	N	%	N	%	
Sex					
Male	5	45.5	6	54.5	X ² = 0.843 df = 1 p value = 0.468
Female	10	30.3	23	69.7	
Age when following MSc programme					
35 and below	11	32.4	23	67.6	X ² = 0.201 df = 1 p value = 0.714
36 and above	4	40.0	6	60.0	
Permanent residence when following MSc programme					
Western province	12	31.6	26	68.4	X ² = 0.783 df = 1 p value = 0.394
Other provinces	3	50.0	3	50.0	
Marital status when following the MSc programme					
Married	13	32.5	27	67.5	X ² = 0.496 df = 1 p value = 0.596
Unmarried	2	50.0	2	50.0	
Employment sector					
State or academia	10	29.4	24	70.6	X ² = 1.458 df = 1 p value = 0.271
* Dual or general dental practice	5	50.0	5	50.0	

P value based on Fishers exact test

*Dual employment means working full time in state sector and part time private practice

When the perceived relevance of the MSc programme to career development was assessed, “useful for multidisciplinary collaboration” was cited as the most important (Table 4).

With regards to the benefits of the MSc programme to the career, 47% had cited that knowledge gained during the programme was helpful to carryout duties at the field level (Table 5).

Table 6 shows the associations between selected sociodemographic factors and whether or not the respondents proceeded to follow the MD programme. It was evident that none of the socio-demographic factors considered was significantly associated with the outcome. Of the 10 respondents selected for the in-depth interviews, 9 participated and the findings were grouped according to four thematic areas; benefits to career, limitations of MSc programme, recommendations for improvement of the programme and the opinion about the suggestion to amalgamate the course content of the MSc programme with the MD programme. The majority indicated that the knowledge gained in areas such as research, public health system of Sri Lanka and computer skills was very beneficial for their career.

Inadequate field practice experience and lack of hands-on experience on the use of statistical software packages were recognized as limitations of the MSc programme. The interviewees had recommended the inclusion of field practice sessions in the MSc programme. Further they stated that they did not have a defined job to perform in the field set up. Two interviewees stated that the position of Regional Dental Surgeon which is equivalent to the position of a district dental officer should be assigned to those possessing the MSc in Community Dentistry.

Seven out of nine respondents who took part in the in-depth interviews stated that the course content of the MSc programme should not be amalgamated with the MD programme and the

PGIM should offer separate programmes leading to MSc and MD degrees in Community Dentistry. Some reasons mentioned with regard to this proposition were ‘all cannot commit for a MD programme due to its long duration and some may not want to specialize but be satisfied with a Master’s degree’.

Discussion

Community Dentistry is one of the career pathways currently available for dental surgeons in Sri Lanka and many young dental graduates have shown an interest in pursuing postgraduate studies in this discipline. According to the available information from the PGIM the number of enrollees in the Master’s programme in Community Dentistry has increased in recent times⁸. This is the first study which had attempted to trace the dental surgeons who had obtained the MSc in Community Dentistry degree offered by the PGIM, Colombo.

It is evident from the findings that nearly 66% of the respondents having obtained the Master’s degree in Community Dentistry had opted for further specialization in the discipline. A study conducted in Malta among graduates of all academic and vocational institutes during the period 2013 -2014, found that around 67% upon completion of the first degree, had enrolled in further studies. Also 76% of those who did not continue their studies after completing the first degree had stated that they have plans for further studies⁹.

All except one participant are currently employed in public health sector. That participant who is attached to the private sector is now engaged in clinical dental practice. This is due to the fact that there are no recognized job opportunities for dental surgeons with expertise in dental public health in the private health sector of Sri Lanka. This finding is similar to those from other countries where the majority of public health workers are employed by the state health sector¹⁰. However, those possessing MSc degrees

in public health in the USA are employed as health care administrators, epidemiologists, public health project managers, public health educators and health care consultants in the private healthcare sector as well¹¹. The American Association of Public Health Dentistry (2020) has highlighted the uniqueness of the dental public health profession and about the availability of job opportunities for those with dental public health qualifications in the education and research sectors, military, federal agencies, state and local health departments and non-profit organizations¹².

When reasons for not proceeding to follow the MD programme after obtaining the MSc degree was assessed, around 50% had mentioned family commitments/ personal reasons. A study conducted among doctoral candidates in Africa¹³ had found that the age of the student at the time of enrolment, coupled with professional and family commitments, inadequate socialization experiences, poor student-supervisor relationships and insufficient funding to be responsible for non-completion of doctoral programmes. Motseke, (2016) assessed the reasons for quitting postgraduate training among adult learners in a South African township found that lack of computer skills, poor research skills, inadequate access to the internet, stress, supervision problems, as well as employer's workload as contributory factors for quitting postgraduate programme¹⁴.

With respect to the relevance of the MSc training to the participants' present career, many had cited that the programme was relevant for multidisciplinary collaboration, development of leadership skills in public health and research skills. Further around 50% had indicated that the knowledge gained during the course was beneficial to function as an effective and efficient dental public health practitioner at the grass root level. These findings indicate that the course content of the MSc programme in Community Dentistry is relevant to achieving the aim of the programme; to equip dental surgeons with knowledge, attitudes and skills required to

function as efficient and effective dental public health practitioners within the framework of the community dental services of Sri Lanka. In fact, Wykoff et al (2015) have stated that programmes leading to degrees in public health should cater their competencies and curricula to match the needs of the employer¹⁵.

This study also assessed the socio demographic factors that were associated with the respondent's decision to continue/not to continue further specialization in Community Dentistry. None of the factors considered were statistically significant. This may be due to the small sample size leading to inadequate power. In their study to determine the relationship between personal characteristics and career intentions in medical graduates, Scanlan et al (2019) found that being a male was a significant predictor for pursuing specialty training¹⁶.

The majority of participants of the in-depth interviews was of the opinion that the PGIM should offer two degrees; MSc and MD in Community Dentistry. In fact in countries like the United Kingdom, the Master's in Dental Public Health is considered as a pre-requisite to obtain specialist qualifications in Community Dentistry¹⁷. Therefore based on the findings of this study it is important to inform the PGIM to shelve the idea of amalgamating the MSc and MD degrees in Community Dentistry.

Conclusion

Around 65% of the participants had proceeded for specialization following completion of the Masters programme. Of those who did not proceed to follow the MD, around 27% had reverted to clinical dental practice after the MSc. The majority of the participants perceived that that the programme was relevant for multidisciplinary collaboration in the career. Family commitments/ personal reasons was the main reason for not proceeding for specialized training. In depth interviews revealed that the MSc programme should focus more on practical aspects of dental

public health. The need for a designated position in the public oral health care delivery system for those who qualify with MSc in Community Dentistry was also highlighted.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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Prevalence of oronasal fistulae and velopharyngeal insufficiency following cleft palate repair at cleft care centre, Dental Hospital (Teaching) Peradeniya, Sri Lanka

P. Wijekoon, D. Bandaranayake, N. Saleemdeen

Abstract

Introduction: Cleft lip and palate is the commonest congenital abnormality in the head and neck region. Development of oronasal fistula is one of the post-surgical complications associated with cleft palate surgery. The prevalence of oronasal fistulae and their effects on speech vary widely.

Objective: To determine the prevalence of oronasal fistulae and velopharyngeal insufficiency following primary cleft palate surgery.

Methods: This cross-sectional study examined 200 children who underwent cleft palate surgery from 2013 -2017, by a single surgeon. Patients who were 2 years or older at the time of last follow-up after the surgery were included. Out of the total of 380 patients who met the criteria, 200 were selected randomly using convenient sampling technique to represent the group. Demographic and palate related information was collected from the surgical records. Pittsburgh's classification and McWilliams and Phillips evaluation scale were adopted to assess fistulae and velopharyngeal insufficiency, respectively. Descriptive analysis was carried out using Microsoft Excel.

Results: Out of 200 children 53.5% were females

and 46.5% were males. Sinhalese represent 70% of the group while 10%, 16% and 4% represent Tamil, Moor, and other ethnic groups respectively. Mean age of the children of the study group was 4 years. The mean age at the time of surgery was 9.5 months while mean period of follow-up after cleft palate surgery was 3 years and six months. Out of 200, children 27 (13.5%) participants with bilateral clefts, were excluded from the study due to difficulties in measuring the width of their clefts, reducing the total number to 173.

Fistula was detected in 10.98% (n=19) of 173 patients out of whom, two had submucous cleft palate. VPI was found in 17.92% of the total. Majority had acceptable speech (79.77%), while hypernasality was detected in 20.23%.

Conclusions: The present study reported a prevalence of fistulae and velopharyngeal insufficiency in children who have undergone primary cleft palate surgery which is compatible with other studies. Although there is controversy on best protocol for cleft palate repair satisfactory results could be achieved by following the basic principles by employing a well tried out protocol and adhering to it with consistency.

Key words: Oronasal Fistula, Cleft surgery, velopharyngeal insufficiency.

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Introduction

Cleft lip and palate is the commonest congenital abnormality in the head and neck region. Treatment of the child with a cleft lip and palate involves repair of the birth defect (lip, palate, and nose), achievement of normal speech, language, hearing, functional occlusion, and good dental health. One of the known complications of cleft palate repair is the formation of fistulae. Affected children with oronasal fistulae can have a range of functional problems including nasal regurgitation, speech difficulties due to nasal air escape and articulation¹.

The prevalence of oronasal fistulae (ONF) and its effects on speech as reported in the literature vary widely irrespective of variables such as age at which repair was done, type of cleft and the method of repair^{2,3,4}.

Surgeon's skills and experience may be one of the important factors affecting the variability of outcome with regard to fistulae and speech^{5,6} as these complications were found to be lesser in centres with higher number of patients.⁷

Common sites of ONF are the junction between soft and hard palate, the alveolar region and behind the incisive foramen in bilateral cleft palates. The thinness and the tension of mucosa at the junction between soft and hard palate due to action of muscle, could be the reason for the vulnerability of this area compared to other regions. Presence of two layers of mucosa and muscle in between, demanding meticulous closure during repair could also be a possible factor making these areas more susceptible to ONF formation^{8,9,10}.

Factors affecting VPI are mainly the type, and width of the cleft which can result in excessive tension at surgery, immobility of the soft palate due to excessive scarring and inadequate repair of the muscles of soft palate.

These problems could be minimized by adopting

methods to mobilize and reposition the muscles. Intravelar-veloplasty and Furlow double opposed flap technique are two such techniques which have shown significant reduction in the incidence of VPI^{11,12}.

Higher incidence of VPI with increase of age at which palatal closure was done has been reported¹¹. However, incidence of VPI was not increased in patients who had undergone two stage palatoplasty, where hard palate closure may be delayed till the child was three years old¹³, the question about the ideal age at which the palatal closure should be performed, balancing the opposing effect of palate surgery on speech and growth has not been completely resolved, though several protocols are being adopted.

Surgeons with experience tend to practice the method they are familiar with rather than experiment with new methods and innovations. This may be a good policy if the particular method has given good results. There are three well developed cleft centres in Sri Lanka each undertaking care of 150 -200 new cases of CL&P annually. This number could be considered adequate to ensure consistency and satisfactory results. Yet Sri Lankan data on these aspects have not been extensively researched and results made available, contributing to the published literature on the subject. There are few studies carried out in Sri Lanka on prevalence of ONF in patients with cleft palate after cleft surgeries⁹, But investigators were unable to find any published studies in Sri Lanka on prevalence of ONF and VPI in patients who have undergone primary cleft palate surgery.

Objectives

The objective of the study was to determine the prevalence of ONF and VPI after primary cleft palate surgery, at Cleft Centre at Department of Oral and Maxillofacial Surgery, University of Peradeniya, Sri Lanka. It also aimed at describing the epidemiology of ONF and prevalence of VPI based on the type and width of the cleft palate and to examine the incidence of ONF in either type of

isolated cleft palate, (the U shaped and V shaped cleft) following CP surgery.

Materials and Methods

This cross-sectional study carried out in the year 2020, examined children with varying types of cleft palate who underwent primary cleft palate surgery. The children who had been operated between the years 2007 and 2017, by a single surgeon and were 2 years of age or older at the time of the last follow-up after the surgery were included in the study. Total number of patients qualifying the criteria were 380 out of which 200 were randomly selected using convenient sampling technique, to represent the total number who underwent cleft palate surgery.

Type of cleft palate was classified according to Veau's classification, which is greatly simplified classification of palatal clefts consisted of four morphological forms.

- I. Clefts of the soft palate
- II. Clefts of the soft and hard palate, up to the incisive foramen
- III. Clefts of the soft and hard palate extending unilaterally through alveolus
- IV. Clefts of the soft and hard palate extending bilaterally through alveolus

Measurement of the width of the cleft palate at the junction of hard palate and soft palate taken preoperatively, in the operation theatre was recorded in a standard data entry form in every patient undergoing cleft repair. Children who had associated syndromic features, and chronic illnesses as well as children with incomplete surgical records were excluded from the study.

Informed written consent from the parent and assent from child over 6 years were obtained prior to the study. An information sheet containing the study purpose and details regarding the study was provided to the parents before obtaining consent.

Children's surgical records and data entry sheets were perused to extract information on the sex,

age at which palate surgery was performed, type of cleft palate according to Veau's classification, width of cleft at the soft and hard palate junction, method of palate surgery and post-operative wound dehiscence if any.

Intraoral examination for detection of ONF in review appointment was carried out and recorded when present according to Pittsburgh's classification 1 to 4, by the surgeon while detection of VPI using a speech scale was carried out by speech therapist.

All the patients were assessed once by a speech and language pathologist to identify VPI using McWilliams and Phillips evaluation scale (Also known as Pittsburgh Weighted Speech Scale - Appendix I) which rates five components of speech including nasal emission, facial grimace, nasality, phonation, and articulation to obtain the score. Data were analysed using the Microsoft Excel. The ethical approval was obtained from the Ethics Review Committee of the Faculty of Dental Sciences, University of Peradeniya, Sri Lanka (ERC/FDS/UOP/I/2019/23).

Results

A total of 200 who met the eligibility criteria selected randomly using convenient sampling technique were included in the study. Out of them (53.5%) were females and (46.5%) were males. Most of the participants were Sinhalese (70%) while (10%), (16%) and (4%) belonged to Tamil, Moor and other ethnic groups respectively. Mean age of the children of the study group was 4 years. The mean age at the time of surgery was 9.5 months while mean period of follow-up after cleft palate surgery was 3 years and six months if speech is satisfactory, and there were no indications for revisional surgeries such as fistula closure or lip revision.

As in Figure 1, Out of 200 children with cleft palate, 22% right primary and secondary cleft palate and 30.5% left primary and secondary cleft palate were seen. Only (5%) was found to

Appendix 1. (A) Pittsburg Weighted Speech Scale (PWSS) - The weighted score for speech symptoms connected to VPI

Speech components	Right	Left
Not present	0	
Inconsistent, Visible	1	
Consistent, Visible	2	
Nasal escape on nasals appropriate	0	
Reduced	0	
Absent	0	
Audible	3	
Turbulent	3	
Absence of facial grimace	0	
Presence of facial grimace	2	
Normal	0	
Mild Hypernasality	1	
Moderate Hypernasality	2	
Severe Hypernasality	4	
Mixed: Hyponasality - Hypernasality	2	
Cul deSac	2	
Hyponasality	0	
Normal	0	
Hoarseness or Breathiness		
Mild	1	
Moderate	2	
Severe	3	
OR:		
Reduced Loudness	2	
Tension in System	3	
Other		
Speech components	Right	Left
Normal	0	
Developmental Errors	0	
Errors from other causes not related to VPI	0	
Errors related to anterior dentition	0	
Reduced intraoral pressure for the sibilants	1	
Reduced intraoral pressure for other fricatives	2	
Reduced intraoral pressure for plosives	3	
Omission of fricatives and plosives	2	
Omission of fricatives or plosives plus hard glottal attack for vowels	3	
Lingual Palatal sibilants	2	
Pharyngeal fricatives, plosives, backing, snorts, inhalations or exhalation substitutions	3	
Glottal stops	3	
Nasal substitutions for pressure sounds	4	

(B) Scores to identify VPI

Probable nature of the velopharyngeal sphincter	Total score
Velopharyngeal competency	0
Borderline velopharyngeal competency	1 - 2
Borderline velopharyngeal incompetency	3 - 6
Velopharyngeal incompetency	7 and up

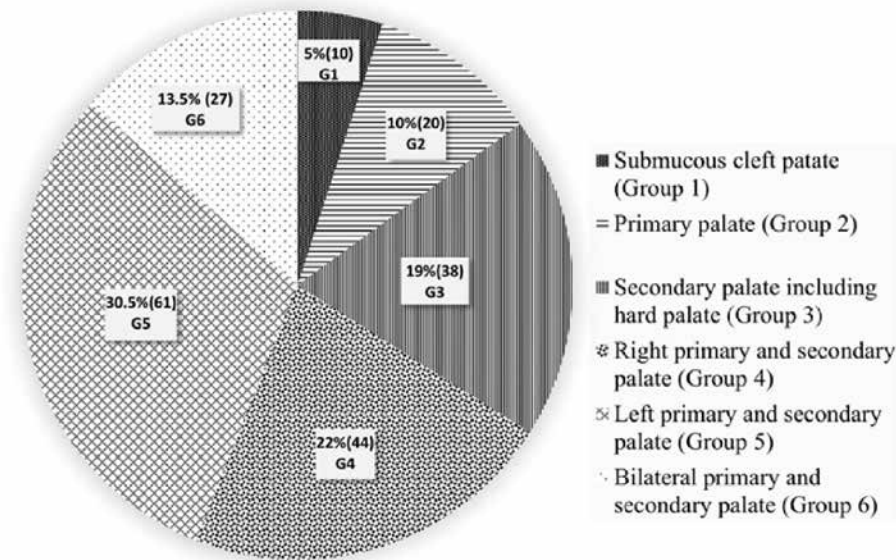


Figure 1. Types of cleft palate

have submucous cleft palate, Cleft in primary palate, secondary palate (including hard palate), and bilateral primary and secondary palate were found in 10%, 19% and 13.5%, respectively.

Of the total participants, 27(13.5%) participants with bilateral clefts had to be excluded from the study due to difficulties in measuring the width of their clefts making the number of patients in the study group 173.

Fistula was detected in 10.98% (n=19) of 173 patients. Out of them, two had submucous cleft palate while the remaining 17 belonged to 3 groups, based on widths of the clefts.

According to Table 1, 41.62% and 21.39% of the participants had clefts measuring less than 5mm and greater than 10mm respectively while 30%

of them were having a cleft measuring between 5 - 10 mm. Two out of 5 (20%) patients with submucous cleft palate, had developed ONF after palatal repair.

ONF were grouped as type I to V adopting Pittsburgh classification.

Figure 2 shows the prevalence of these fistula types. The prevalence of type I fistulae (bifid uvula) was found to be the lowest (5.26%) while highest prevalence was observed in type III fistulae which occur at hard palate soft palate junction (42.11%).

Prevalence of VPI was found to be 17.92% in the study population. The prevalence of VPI in patients with unilateral cleft palate, with cleft width less than 5mm was 1.16% while it was 5.78

and 9.83 per cent for children with unilateral cleft palate with a cleft width between 5 - 10mm and greater than 10mm, respectively.

Figure 3 shows the prevalence of VPI in various types of cleft palate. A lower incidence of VPI in participants with primary palate (0.58%) was observed while it was found in (6.36%) patients with left primary and secondary palate. Of the 173 study participants 5.2%with unilateral cleft palate with secondary cleft palate, were found to have VPI.

Further, study participants with isolated cleft palate were grouped into two categories based on whether the cleft was U shaped or V shaped. It was found that prevalence of V shaped cleft

palate (14.45 %) was two times higher than the U-shaped cleft palate (7.51 %).

Of those who had U shaped cleft palate, 2.31% and 3.47% developed ONF and VPI, respectively. On the other hand, prevalence of ONF and VPI in children with V shaped cleft palate was 1.73% and 1.23% respectively.

Majority of the study participants had developed acceptable speech 138 (79.77%), but hypernasality was seen in 35(20.23%) of the study population who had undergone primary palatoplasty. Of them, 14(8.9%), 11(6.35%) and 10(5.78%) had mild, moderate, and severe hypernasality, respectively (Figure 4).

Table 1. Prevalence of fistulae and VPI based on width of the cleft palate

Width of the cleft	Number of patients (n=173)	Prevalence of fistulae per 100 population	Prevalence of VPI per 100 population
5 mm<	72 (41.62%)	0	1.16
5-10 mm	54 (31.21%)	3.47	5.78
10 mm<	37 (21.39%)	6.36	9.83
Submucous cleft	10 (5.78%)	1.16	1.16

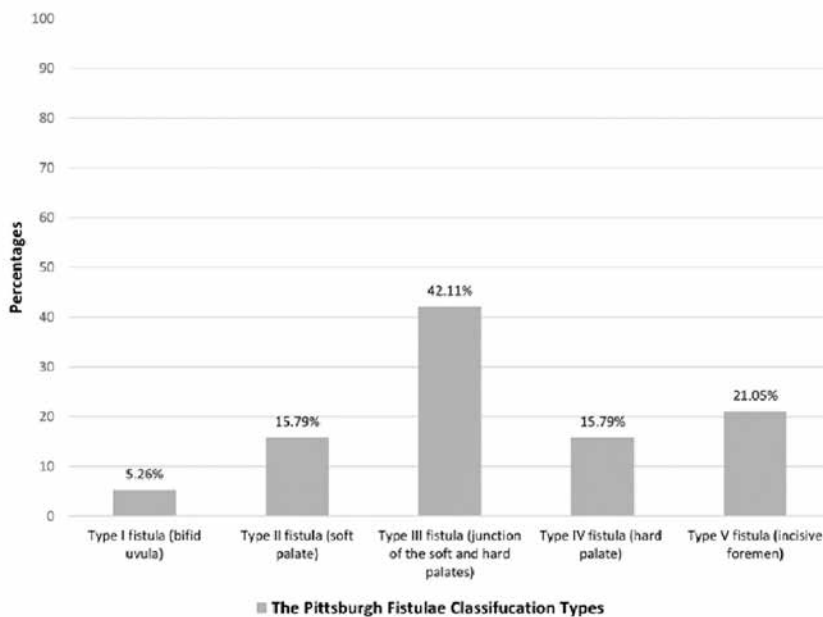


Figure 2. The Pittsburgh fistulae classification system

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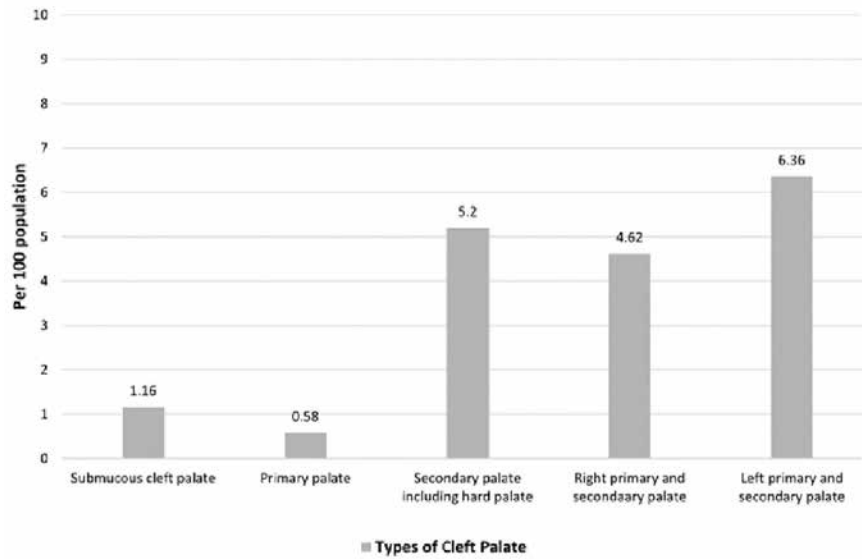


Figure 3. The Pittsburgh fistulae classification system

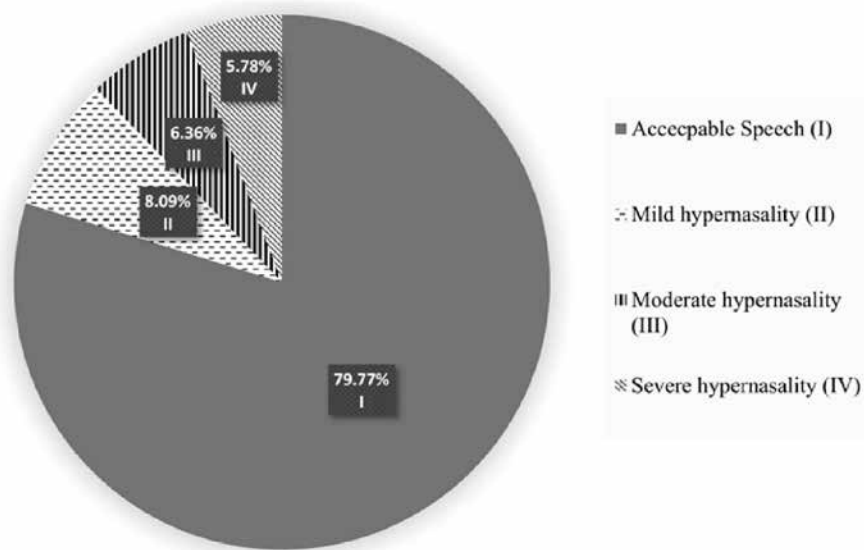


Figure 4. Levels of speech

Discussion

The demography of the study group was comparable to that of the cleft lip and palate population of Sri Lanka⁹. Therefore, it could be considered as that the results would be applicable to the Sri Lankan cleft lip and palate patients. Size of the study group could be considered as adequate compared to similar studies undertaken in the developed countries^{15,16}. Surgery was performed by a single surgeon, adopting the

same surgical technique, while following the same protocol of treatment in all the patients. Therefore, no comparison of method of surgery or protocol is possible within this study. However, this result could be compared with those of other studies where different methods and protocols have been adopted.

Age at the time of surgery is claimed to be crucial for both speech and maxillary growth with

surgery having opposing effects on speech and growth¹⁷. A functional soft palate is a must at the time of speech development for good speech. It has been found that speech development starts around ten months of age^{18,19,20}. Therefore soft palate closure should not be delayed beyond one year of age. Most surgeons attempt to adhere to this rule, but there is no such consensus regarding hard palate closure. In the current series the hard palate had been closed either at the time of lip repair using a vomer flap or later at the time of soft palate repair which had been done within the first year of age. The prevalence of ONF and also VPI were not significantly different from the results reported in other studies where the protocol and method had been similar¹².

The development of ONF following cleft palate repair is reported from in all cleft centres It is possible that cause of ONF is multi-factorial where type of cleft, anatomical features, width of cleft, post-operative infections and post-operative management play a role^{5,9,22,25} due to factors that are beyond control.

The natural characteristics of the anatomy of the cleft palate such as thin mucosa, complexity as in the alveolar region may be factors that are beyond control even in the hands of skilled surgeons, whereas contributory, factors such as closure under tension would be minimal in experienced hands. Prudent use of lateral incisions may need to be considered. In this series lateral incisions had been used in wider clefts.

The site distribution of ONF was comparable to that of previous studies with the junction between the hard and soft palates being the most common site^{8,9,10}. The other common site was the incisive foramen region. Thin mucosa at the soft and hard palate junction and complexity of the anatomy in the region of incisive foramen could be contributing anatomical factors.

The prevalence of VPI in this series was also comparable to the figures reported in previous

studies^{2,10,25,26}. In this series both the soft palate and the hard palate had been repaired before one year and therefore speech development could be expected to be satisfactory. In centres where the hard palate was repaired at three years VPI rates were not excessively increased compared to the results of other centres where the hard palate was repaired early²⁷.

The width of the cleft palate proved to be an important factor in the causation of both ONF and VPI. It could be seen that wider the cleft greater the incidence of these two complications. Wide clefts are a challenge to the surgeon. Vomer flap could be a solution very often but there could be clefts too wide to be closed with a vomer flap. Lateral incisions are often employed to overcome the problem but these could compromise maxillary growth. Based on which the surgeons try to manage palate closure without lateral incisions or opt for minimum incisions where it is necessary.

Conclusion

The present study shows that although the controversy surrounding cleft palate surgery with different centres adopting different protocols has not been resolved, fairly satisfactory results could be achieved by following the basic principles by employing a well tried out protocol and adhering to it with consistency.

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A retrospective audit to assess the quality of referral letters received by the Oral Medicine clinic of Dental Teaching Hospital Peradeniya, Sri Lanka

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Abstract

Objective: The aim of this audit was to assess the quality of referral letters sent to the Oral Medicine clinic of Dental Teaching Hospital Peradeniya, Sri Lanka in order to implement changes required for improving the current referral system.

Materials and methods: A retrospective study was performed on oral medicine referrals received between January 2019 and July 2020 at the Oral Medicine clinic of Dental Teaching Hospital, Peradeniya. A total of 112 referral letters were assessed for their quality against criteria in a standard Oral Medicine referral pro forma formulated based on previous studies.

Results: Out of 26 criteria assessed, maximum number of criteria fulfilled by a letter was 19 with the minimum being nine. Patients contact details did not appear in 89.3% of the letters and referring practitioners name, telephone number was absent in 40.2% and 79.5% of the letters respectively. Majority of the letters had no clinical details such as history of presenting complaint (76.8%), investigations done and their findings (98.2%), past medical history (82.1%), first line treatment provided (85.7%), past drug history (98.2%) and clinical warnings (99.1%). Indication of urgency of referral was not mentioned in 98.2% of the letters.

Conclusion: There is room for substantial

improvement in the quality of oral medicine referral letters. We suggest incorporation of the pro forma used in this study as a standard pro forma for writing referral letters in Oral Medicine. Furthermore, steps should be taken to increase awareness among the clinicians regarding the importance of providing adequate information in the referral letters and this should be implemented at undergraduate level or at internship level.

Key words: referral letters, quality, Oral Medicine, pro forma

Introduction

A referral system can be defined as an organized structure for referring medical and dental problems of patients from general practitioners to specialists or between specialists¹. The contact between professionals can occur in different ways such as by telephone or informal conversation. Methods of communication have significantly changed in the past few decades with the emergence of mobile phones, internet and email. Nevertheless, even today written communication in the form of a referral letter is the most common type of communication between general practitioners and specialists². Referral letters are also considered as important medico-legal documentations³. As in medical practice referral of patients in the dental profession is also considered as an integral part of clinical practice.

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A good quality referral letter is essential to enable efficient and effective management of the patient and it acts as the interface between health care professionals in primary, secondary care and tertiary care⁴. Adequate information is essential to allow the secondary or tertiary care professionals to assess the clinical need and urgency and a good quality referral letter has the potential to reduce the waiting time of patients and to minimize the workload of administrative staff^{3,5}. Referrals with inadequate details can lead to discontinuity of care, delayed diagnosis, polypharmacy, weak follow-up plans, repeated and unnecessary tests, and also inability of the receiving physician to recognize the need for referral which ultimately can result in reductions in quality of care, medical errors and increase in health sector expenses^{3,6}.

Dental Teaching hospital Peradeniya is a tertiary care hospital in Sri Lanka. Oral Medicine clinic of this center is the only specialized Oral Medicine clinic in the country, and patients are referred to this clinic from many primary care hospitals and clinics from all over the country. Head and neck cancer, oral potentially malignant disorders, neuralgic pain, temporomandibular joint disorders, salivary gland disorders are the main types of conditions for which referrals are received by this clinic.

Out of these conditions head and neck cancer is one of the most important areas of focus in the dental profession and early diagnosis can be considered as an important aspect of this entity. Delay in diagnosis and referral to a specialist unit can result in an enlarged tumour with an increased chance of metastatic spread. This can lead to upstaging of the tumour, thus worsening the five-year survival rate. Therefore, early identification and referral of potentially malignant lesions can be considered as an important responsibility of general dental and medical practitioners. It is vital that the referral letters sent for potential malignant lesions are of good quality, clearly marked as urgent and contain adequate administrative and clinical data³.

Recommendations and guidelines for referral letters in the field of dentistry had been the subject of many papers^{7,8,9} but only a few studies had been done in Sri Lanka with regards to referral letters². There have been attempts by the medical specialties to formalize and standardize the structure of referral using letter formats. A study done in Sri Lanka by Ramanayake et al (2013) has introduced a pro forma letter which can be used in the field of medicine². But there are no general national guidelines for dental referrals in Sri Lanka and no study has been conducted with regards to any dental specialty in Sri Lanka. This may be the reason for many general dental practitioners omitting necessary details in their referral letters. Previous studies have shown that the use of a standardized referral pro forma resulted in an increase in information provided by the practitioners referring to dental hospitals^{3,9,10,11}. It is important that the pro formas are made best suited to different dental specialties as the areas of focus differ in different specialties.

In Sri Lanka, the healthcare service including dental service comprises of different levels, from the most basic services at primary health care level to the most sophisticated care provided at tertiary levels¹². Patients who need higher levels of management are usually referred by means of a letter to secondary and tertiary levels of care. This referral letter acts as a permission slip to allow the patient easy access to treatment by a specialist at secondary or tertiary service level and communicates reasons for referral¹³. Oral Medicine clinic of Dental Teaching Hospital Peradeniya receives high number of referrals from different centers around the country and most of these letters are handwritten or pro forma based letters. Pro formas used by different centers around the country differ from one another. Since a high number of inadequate referral letters present to the Oral Medicine clinic, the aim of the current audit was to assess the quality of referral letters sent to the Oral Medicine clinic, Dental Teaching Hospital Peradeniya, Sri Lanka based on a pro forma formulated using the published literature.

Methodology

Retrospective and randomly selected referral letters sent to the Oral Medicine clinic of Dental Teaching Hospital Peradeniya, from January 2019 to July 2020 were examined. Altogether 112 letters were selected for the study. The analysis of letter content was done by a single examiner. A standard Oral Medicine referral pro forma was formulated based on previous studies^{3,5,7,8} (Figure

Results

A total of 112 letters were evaluated and 57.1 % were handwritten and 42.9 % were of printed format. Out of the 26 criteria assessed, maximum number of criteria fulfilled by a letter was 19 with the minimum being 9. Date was present in all the letters (Table 2). Patients contact details did not appear in 89.3% of the letters and referring practitioners name, telephone number was absent

Figure 1. Pro forma referral letter

1). The selected referral letters were assessed using the formulated pro forma and additionally the letters were assessed for comprehensibility and legibility. With the addition of those two criteria altogether 26 criteria were used to assess the referral letters. (Table 1) The data was analyzed using SPSS version 21 statistical software and results were presented in frequencies and proportions.

in 40.2% and 79.5% of the letters respectively (Table 2). Majority of the letters had no clinical details such as history of presenting complaint (76.8%), investigations done and their findings (98.2%), past medical history (82.1%), first line treatment provided (85.7%), past drug history (98.2%) and clinical warnings (99.1%) (Table 3). Indication of urgency of referral was not mentioned in 98.2% of the letters (Table 4).

Table 1. Criteria assessed in referral letters

Administrative details	Clinical information
Date	Presenting complaint
Name of consultant/receiving practitioner/specialty clinic	History of presenting complaint
Hospital name	Examination findings
Referring practitioner's name	Investigations done and their findings
Referring practitioner's designation	Past medical history
Referring practitioner's address/place of work	First line treatment provided (including current drug therapy)
Referring practitioner's telephone number	Past drug history
Referring practitioner's signature	Clinical warnings
Patient's first name	Additional information - Habit history
Patient's last name	Reason for referral
Patient's age	Other criteria
Patient's gender	Indication for urgency of referral
Patient's contact details	Legible
	Comprehensible

Table 2. Percentage and frequency of referral letters containing administrative details

Criteria	Present n (%)	Absent n (%)
Date	112 (100)	0 (0)
Consultant/Receiving practitioner/speciality clinic name	83 (74.1)	29 (25.9)
Hospital name	93 (83)	19 (17)
Referring practitioner's name	67 (59.8)	45 (40.2)
Referring practitioner's designation	108 (96.4)	4 (3.6)
Referring practitioner's address/place of work	108 (96.4)	4 (3.6)
Referring practitioner's telephone number	23 (20.5)	89 (79.5)
Referring practitioner's signature	112 (100)	0 (0)
Patient's first name	109 (97.3)	3 (2.7)
Patient's last name	78 (69.6)	34 (30.4)
Patient's age	104 (92.9)	8 (7.1)
Patient's gender	71 (63.4)	41 (36.6)
Patient's contact details	12 (10.7)	100 (89.3)

Table 3. Percentage and frequency of referral letters containing patients' clinical information and reason for referral

Criteria	Present n (%)	Absent n (%)
Presenting complaint	87(77.7)	25(22.3)
History of presenting complaint	26(23.2)	86(76.8)
Examination findings	69(61.6)	43(38.4)
Investigations done and findings	2(1.8)	110(98.2)
Past medical history	20(17.9)	92(82.1)

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First line treatment provided	16(14.3)	96(85.7)
Past drug history	2(1.8)	110(98.2)
Clinical warnings	1(0.9)	111(99.1)
Additional information	32(28.6)	80(71.4)
Reason for referral	110(98.2)	2(1.8)

Table 4. Percentage and frequency of referral letters containing other criteria

Criteria	Present n (%)	Absent n (%)
Indication of urgency of referral	2(1.8)	110(98.2)
legible	93(83)	19(17)
Comprehensible	103(92)	9(8)

Discussion

Usually first contact of patients presenting for medical and dental treatment is with a general practitioner. In some instances, the chief complaint of the patient requires a specialized diagnosis or treatment which in turn, requires referral to a specialist. The most frequently used method for this purpose is a referral letter¹⁴. The importance of the referral letter has always been emphasized as essential for good communication between general practitioners and consultants. This is highlighted in both the medical and dental literature^{1,7}. Many studies have indicated that this form of communication is inadequate in terms of relaying the essential information required to provide the ideal treatment to a patient^{5,9,14}. In Sri Lanka referral letters are usually hand written and frequent complaints are that these letters do not contain adequate information and retrieval of information is a problem due to poor legibility and clarity².

Therefore, present audit was aimed to assess the quality of referral letters received by the Oral Medicine clinic of the Dental Teaching hospital, Peradeniya which is a tertiary dental care hospital in Sri Lanka. From the results it was evident that most of the referral letters were unsatisfactory in terms of providing the essential information. None of the referral letters fulfilled all the criteria which were assessed and this was similar to

previous study findings⁴. The maximum number of criteria fulfilled out of 26 criteria was 19 with the minimum being nine. This showed that some letters had serious deficiencies which may have led to failed communication among professionals.

The overall standard of receiving practitioner details and patients' details were adequate. More than 50% of the letters contained receiving practitioners' name/specialty clinic name, hospital name, name of the patient, gender and age of the patient. In a study done in Ireland by Molony et al. has reported similar findings⁵ but some studies reported findings contradictory to the present audit¹⁵. A study done in Brazil by Navvaro et al. showed that age of patient was absent in 72.2% of the referral letters¹⁵. Hospital name and consultant/specialty clinic name was absent in 17% and 25% of the letters. Even though these can be considered as low rates, failing to mention them can significantly delay the referral process as the patient could be directed to the wrong clinic or department which may easily occur in large public health institutions where different specialties are located in the same building. All the letters contained the date but only 10.7% of the letters mentioned the contact details of the patient which was similar with the findings of Djemal et al. where patient's telephone number was recorded in less than half the total amount of referrals in United Kingdom¹⁰.

It was clear from the results of the present study that the key information was frequently omitted from the category of “clinical information provided”. The majority of the letters failed to mention essential points such as the history of presenting complaint, investigations done and their findings, past medical history, first line treatment provided, past drug history, clinical warnings such as allergies and additional information like habit history of the patient. This mirrors the results of many studies which showed an overall lack of clinical^{3,5,9,15}. Also most of the studies highlighted the fact that patient’s medical history is poorly covered in referral letters^{1,4,5,9,16} which was identical to the findings of the current audit where only 17.9% of letters mentioned about the medical history. The medical history should not be ignored because this may significantly alter the proper management of the patient. Even if the patient has no medical problems, it is good practice to include this in the referral letter. Omission of earlier mentioned clinical details like history of presenting complaint, investigations done and their findings, first line treatment provided can lead to delays in diagnosis and treatment, unnecessary repetition of investigations and poly pharmacy. A similar study carried out in Brazil by Navarro et al. who analyzed the minimal required content of referral letters sent to an oral medicine specialty clinic, highlighted the importance of drug history especially in relation to the chief complaint¹⁵. For each letter in which the use of drugs was cited they found nine without any information about drugs, representing an omission rate of 9:1¹⁵. In the present audit 85.7 % letters failed to provide the first line treatment provided which included the current drug therapy. Considering the probability of cross reactions between drugs, the data about drug use become more critical and relevant since most of the patients use more than one type of drug. Also this information is particularly important in cases of chronic pain, in which patients report numerous previous consultations with different professionals and various therapeutic modalities

including numerous drugs. The reason for referral was mentioned in almost all the letters (98.2%) which was similar to the findings in a study carried out in UK by Yaqoob et al¹⁶.

The referral letters were satisfactory in terms of some of the administrative data appraised such as referring professionals’ designation, address and signature. This agrees with previous studies^{4,5}. All of the letters comprised of the signature but name of the referring practitioner and phone number for contact was absent in 40.2% and 79.5% of the letters respectively. These results were quite opposite to the result of previous studies where administrative details like name, telephone number of referring practitioner were almost universally provided^{4,5}. This may be due to the fact that the practitioners not considering these details to be essential and finding it unnecessary to mention them.

Indication for urgency was only mentioned in 1.8% of the letters. The literature shows that in many referrals the urgency is not always obvious owing to inadequate information provided in the referral letter¹⁷. Comprehensibility, legibility and overall format are also important features of a good referral letter. In the present study 17% of the letters were illegible and 8% of the letters were incomprehensible. An audit conducted by Moloney et al in Ireland showed a rate of 100% in both comprehensibility and legibility criteria⁵. This difference may be due to the higher percentage of hand written letters (57.1%) included in the present audit. It can be considered futile if the information is not legible, even if all the details are mentioned in the referral letters.

Referral letters can be handwritten, typed or filled in on standard pro formas. In the current audit 57.1% of the letters were hand written and 42.9% were of printed format/proforma letters and none were typed. It is evident from previous literature that proforma based referrals are the most accurate and use of a proforma for referrals can result in an increase in the quality and quantity

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Medicine clinic of Dental Teaching Hospital Peradeniya, Sri Lanka

of information provided regarding the patient^{9, 10, 11, 14}. But no conclusion can be made on this aspect with regards to the present audit due to the variations in the proforma based referrals used in different centers around the country. Referral letters sometimes may be the only means of contact between general practitioners and consultants. Thus, the lapse of data in the referral letters presented in this audit suggest that there is room for substantial improvement in the quality of referral letters sent to Oral Medicine clinic of Dental Teaching Hospital Peradeniya, in order to improve patient services.

Conclusion

It can be concluded that referral letters sent to Oral medicine clinic, Dental Teaching hospital Peradeniya were inadequate and incomplete in terms of essential information being conveyed to the receiving practitioner. Incorporation of a standardized referral pro forma into practice would be a worthwhile and relatively simple step towards improving the quality of referral letters and thus improving patient care. Measures needed to be taken to design standardized referral pro formas best suited to other dental specialties in Sri Lanka as well.

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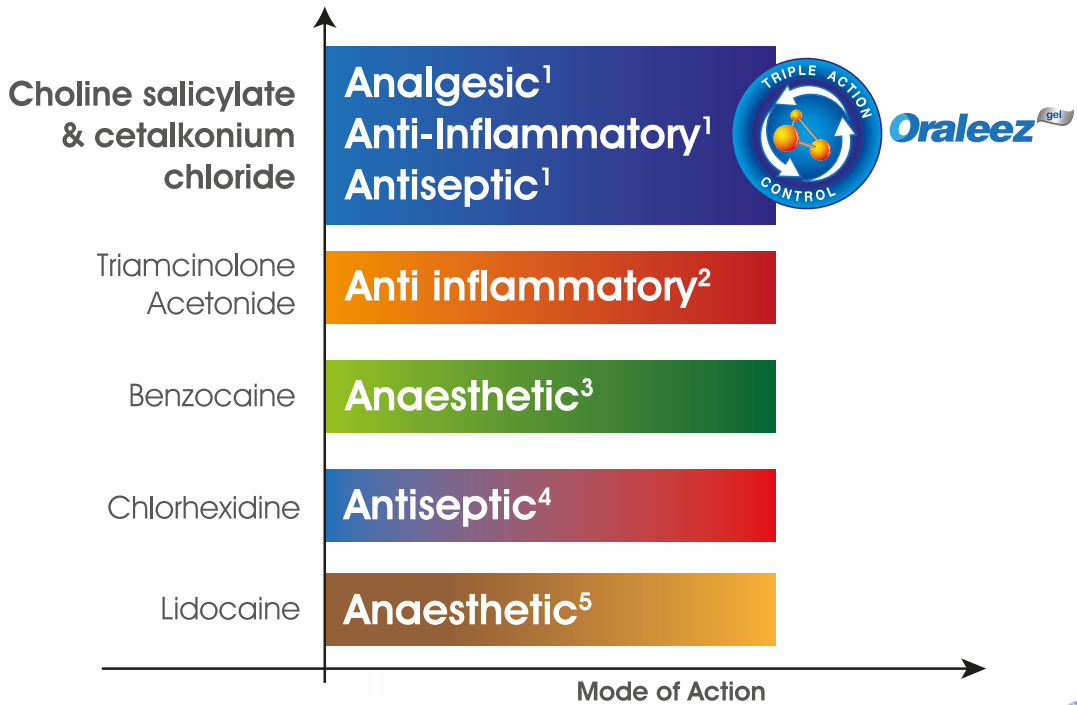
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