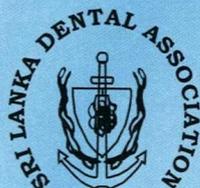


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EDITORIAL

At the threshold of the 80th year of the Sri Lanka Dental Association

SLDA, the main professional organization of the dental surgeons in Sri Lanka established on the 6th of December 1932 moved into its eightieth year in 2012. When we reflect on the history of dentistry in Sri Lanka, we can be really proud of ourselves for the professional achievements gained during the last eighty years. The dental profession has made a victorious march during the last eighty years in all possible directions: namely, professional identity, international recognition, social status and undergraduate and postgraduate education.

Formal dental education was initiated in 1943 with the establishment of the Department of Dental Surgery under the then School of Medicine in Colombo. This was a result of the continuous agitation of the Ceylon Dental Association. Shifting this institute to Augusta Hill at University of Peradeniya in 1953 and reinstituting it as an independent Dental School is another unforgettable event in the formal dental education in Sri Lanka. With the aim of facilitating the programme, the Dental School was affiliated to the Faculty of Medicine in 1962. Receiving its faculty status in 1986 was also a remarkable landmark in the history. The establishment of the new faculty complex and the dental teaching hospital in 1998 under the outright Grant Aid Project of Japan was yet another milestone in the dental education in Sri Lanka.

Our achievements in the postgraduate dental education evolved with the establishment of the

PGIM in the year 1980. MS in Dental Surgery was the first postgraduate programme initiated in 1984. MD in Restorative Dentistry , MD in Orthodontics, MD in Community Dentistry and MD in Oral Pathology took off the ground in 1994,1998 and 2008 respectively.

Holding the Commonwealth Dental Congress in 2006, the Asia Pacific Dental Congress in the years 1997 and 2010 and the FDI World Dental Congress scheduled to be held in 2013 are some of the achievements of the SLDA in the international arena.

In conclusion, I would like to take this opportunity to express my gratitude and appreciation for those members of the profession who have devoted and sacrificed their time, effort and energy to bring credit to the profession. Further, it is the duty and the responsibility of the current members of the profession to maintain high ethical and moral standards together with strict discipline, securing what we have achieved thus far for future generations.

Upul B. Dissanayake

Pharmacological management of acute and postoperative pain in dental practice

N.S. Soysa

Introduction

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Pain can be either acute or chronic. Acute pain occurs as a result of recent tissue injury, has a short duration whereas chronic pain often has an unclear etiology and can last for years long after the injury has healed.¹ Dental pain is usually acute in nature with some degree of inflammation. Non invasive dental procedures namely tooth extraction, endodontic therapy, scaling and root planning and more traumatic procedures like surgical removal of third molars, bony impactions and osseous periodontal surgery require conventional analgesics. Acute tissue trauma causing inflammation results in local release of chemical substances such as prostaglandins (PG) send nociceptive information from the periphery to the central nervous system (spinal cord and brain) through a primary sensory (or afferent) neuron in the peripheral nervous system. A secondary sensory neuron in the spinal cord or brain stem transmits the information to the thalamus whereas a tertiary sensory neuron conveys the nociceptive information from the thalamus to the cerebral cortex. Inhibitory effects are achieved through the descending pathways. By sending responses back to the periphery, the brain can order the release of chemicals that have analgesic effects, which can reduce or inhibit pain sensation. Conventional analgesics either interrupt ascending nociceptive impulses

or depress their interpretation within the central nervous system.

Patients typically associate dental treatments with pain. Experience in poorly managed pain due to dental treatments results in avoidance of dental treatment or postponement. It has been shown that medications that reduce pain can improve clinical outcomes.² Preoperative administration of some analgesics reduces the onset of postoperative pain. Analgesics are classified as opioids and nonopioids. Opioids, as represented by morphine activate opioid receptors (μ , κ and δ) in a manner identical to opiates. Nonopioids including nonsteroidal anti-inflammatory drugs (NSAIDs) interrupt PG synthesis. Analgesics can be combined to target both peripheral and central pain pathways. Range of analgesic effect can be achieved by combining drugs with different onset or duration of actions.³

Nonopioid analgesics

Most of the time postoperative dental pain is associated with an inflammatory component. Therefore, NSAIDs are the most rational first line agents. Nonopioid analgesics include paracetamol and NSAIDs. NSAIDs are generally equivalent or superior to opioids in managing musculoskeletal pain at conventional doses with a lower incidence of side effects, including the potential to abuse.⁴

NSAIDs

NSAIDs are effective in alleviating mild-to-moderate pain associated with inflammation. All NSAIDs have greater potency as analgesics and antipyretics than as antiinflammatory agents. Ibuprofen is considered the prototype of NSAIDs. NSAIDs include ketorolac, flurbiprofen, ketoprofen, diclofenac and aspirin. The therapeutic effects and the side effects of NSAIDs can be explained by their ability to inhibit cyclooxygenase enzymes (COX).⁵ Endogenous and exogenous stimuli such as trauma cause release of arachidonic acid from the phospholipids in the cell membrane. COX enzymes convert this fatty acid to prostanoids namely PG, thromboxanes and prostacyclins (Figure 1). COX-1 is ubiquitous and has a role in the protection of stomach mucosa, platelet aggregation and kidney function. COX-2 which is induced during inflammation causes pain and inflammation via synthesis of PG. Arachidonic acid is also a substrate for lipoxygenase which converts it to leukotrienes. Leukotrienes cause anaphylactoid effects including bronchospasm and upper airway edema.⁶ Therefore inhibition of COX by NSAIDs can result in reduction in the synthesis of the various prostanoids and at the same time allow more arachidonic acid to convert into leukotrienes (Figure 1).

Preoperative use of NSAIDs has been shown to decrease the intensity of postoperative pain if it's administered before the local anesthesia wanes and tissue remain anesthetized. Ibuprofen is the best first-line drug for acute pain or postoperative dental pain. Optimal dose of 200-400 mg may reduce pain and fever and should be maintained for 2-3 days before an alternative agent is prescribed. NSAIDs exhibit a ceiling effect so that additional increase in the dose does not provide further benefit. Analgesic ceiling for ibuprofen and aspirin is 1000 mg and, 400 mg, respectively. As the dose of NSAIDs increase the antiinflammatory effect is increased until maximum safe dose preclude any further increase. Therefore daily consumption of 1600-2400 mg

of ibuprofen may be necessary to suppress inflammation adequately. For any given NSAID it is advisable to reserve the lower doses for analgesia while upper doses for those with swelling and inflammation, but optimal doses should be established before assuming that the given NSAID has failed. The doses of most commonly prescribed NSAIDs are given in Table 1.

PG present in the gastro-intestinal (GI) tract has a protective role and the inhibition of PG by NSAIDs cause GI toxicity causing mucosal damage. Buffered aspirin as well as parenteral administration do not exclude the possibility of getting GI erosion and ulceration. Inhibition of COX in platelets reduces the synthesis of thromboxane A₂ necessary for platelet aggregation. As the inhibition of COX by aspirin is irreversible and last the life span of platelets (10-14 days) aspirin is the only NSAID proven effective in preventing thrombotic events (a daily dose of 80 mg) such as acute coronary syndrome or stroke. Other NSAIDs bind weakly and reversibly to platelet COX resulting in mild antiplatelet effect and increase the bleeding times, though they do not cause significant clinical bleeding after minor oral surgical procedures. It is advisable to avoid NSAIDs in patients who are receiving anticoagulants such as warfarin and antiplatelet drugs like clopidogrel.⁴ Here the major concern is not the antiplatelet effect exert by NSAIDs, rather their toxic effect on the GI mucosa which might cause excessive bleeding that is not easily seen and self-limiting, and cannot be managed locally.

PG has a role in renal perfusion and long term high doses of NSAIDs seem to cause nephrotoxicity. NSAID intolerance occurs as a result of shift of COX pathway towards leukotriene synthesis as a result of COX inhibition (Figure 1). NSAIDs exacerbate asthma and contraindicated in patients known to show allergy to NSAIDs. Prolong use of NSAIDs have shown to interfere with the effectiveness of antihypertensives except calcium channel blockers through dimin-

ished vasodilator effects attributed to inhibition of renal PG. Ibuprofen competitively inhibits the antiplatelet effect of aspirin and its not advisable to combine these two drugs.⁷ Increased GI bleeding is reported in patients taking antidepressants such as selective serotonin reuptake inhibitors (SSRI) and NSAIDs. Concurrent intake of NSAIDs with lithium and methotrexate cause elevation of latter two drugs. PG are necessary to maintain the patency of the fetal ductus arteriosus, therefore should be avoided throughout the pregnancy. In all cases where NSAIDs are contraindicated, paracetamol is the conventional nonopioid alternative.

COX-2 selective inhibitors

COX-2 NSAIDs which selectively inhibit COX-2 were developed with the aim of improving the GI safety and side-effect profile of nonselective NSAIDs. While COX-2 inhibitors, celecoxib and rofecoxib may reduce the GI ulceration, they may not reduce the risk of cardiovascular complications as selective COX-2 inhibitors tilts prostanoid production towards platelet aggregation.⁸ Both the above mentioned inhibitors have longer clinical duration of action than aspirin, paracetamol and ibuprofen. But some of the disadvantages of COX-2 inhibitors include no greater effectiveness than conventional NSAIDs (eg. Ibuprofen) for dental pain; higher cost than conventional NSAIDs (especially those available in generic forms); not available over-the-counter and possible inadequate duration of action for postoperative dental pain. NSAIDs, such as ibuprofen, naproxen, diflunisal and others, remain first-choice drugs for the treatment of mild-to-moderate pain in dentistry in patients lacking the contraindications for such drugs. COX-2 inhibitors might be appropriate for patients for whom paracetamol provides inadequate pain relief and for those who can not tolerate nonselective NSAIDs.

Paracetamol

Acetaminophen (APAP) commonly known as paracetamol is considered under NSAIDs since

it's believed that paracetamol inhibits PG synthesis in CNS.⁹ Paracetamol interferes with nociception associated with spinal N-methyl-D-aspartate (NMDA) receptor activation. This effect involves an inhibitory action on nitric oxide (NO) pathways. Paracetamol is a poor inhibitor of peripheral PG synthesis, thereby lacking anti-inflammatory effects and peripheral side effects attributed to NSAIDs. Paracetamol in recommended doses has relatively safe side-effect profile. As an analgesic and antipyretic paracetamol is equal in potency and efficacy to aspirin but somewhat inferior to ibuprofen and other NSAIDs.¹⁰ The ceiling responses for paracetamol occurs at 1000 mg. Paracetamol 1000 mg has been shown to be effective compared with placebo for extraction of third molars, alveolectomy, multiple extractions, apicoectomy, biopsy and deep gingival curettage. Pain relief for paracetamol is maximal up to four hours after administration and limits the usefulness as a monotherapy for the treatment of moderate-to-severe post-operative pain. Hepatotoxicity is the most significant adverse effect of paracetamol and is attributed to its toxic metabolite that can not be conjugated when the doses exceed 200-250 mg/Kg in a 24 hour period.¹¹ Alcohol intoxication has been shown to predispose patients to hepatotoxicity at the normal dose of 4 g/ d, therefore requires a daily intake of 2 g by those patients.

Opioid analgesics

The antinociceptive effect of opioid is by acting as agonists at opioid receptors in CNS. Opioids are thought to prevent the release of substance P through mu receptors. Usually opioids are reserved for moderate-to-severe pain. Opioid analgesics do not exhibit a ceiling effect and the analgesic effect to opioids improves as their dose is increased but the side effects preclude the use of doses adequate to completely relieve severe pain. Sedation, respiratory depression, dependence, nausea and constipation are few effects of opioids. Patients develop tolerance to most opioid effects after prolong use except

constipation and miosis. Patients on opioids more than a week might develop some degree of dependence requiring tapering off of the dose to prevent withdrawal symptoms. Unlike dependence opioids do not produce addiction. Addiction is due to the compulsive pattern of behavior of an individual who continues to seek the drug for pleasure rather than the medical purposes. At equipotent doses all opioids provide same degree of pain relief. 200 mg of codeine, 30 mg of hydrocodone and 20 mg of oxycodone, are equipotent oral doses and are equianalgesic to 10 mg morphine I.M as a monotherapy. Codeine 60 mg produces pain relief identical to that provided by paracetamol 600 mg for postoperative pain. Tramadol 200 mg is effective in postoperative pain management after third molar extraction and has an analgesic duration of 4 hours. Tramadol is used successfully to treat patients with chronic periodontitis, chronic pulpitis and alveolitis.

Combination analgesic therapy (Multimodel/balanced analgesia)

Usually mild-to-moderate pain can be managed by using optimal doses of nonopioids, ibuprofen 400-800 mg or paracetamol 1000 mg or by combining NSAIDs with paracetamol. Opioids can be added, if necessary to manage breakthrough pain (pain that comes on suddenly for short periods of time and is not alleviated by the patient's normal pain management). By combining drugs with different mechanisms of action offers increased efficacy due to additive and synergistic effects without increasing the dose and reduce side effects compared to either treatment alone. Suggested regimens are presented in Table 2.

Paracetamol combinations

Paracetamol 650 mg combined with oxycodone 10 mg is more effective in managing dental pain than either alone.¹² Freely combined paracetamol 1000 mg with codeine 60 mg or paracetamol 1000 mg with oxycodone 10 mg is effective in managing more severe pain. Patients with moderate-to-severe pain following extraction of

2 or more third molars can be treated with paracetamol 650 mg combined with tramadol 75 mg. Fixed-dose combinations of paracetamol is available with a weak opioid.¹³ These combinations include paracetamol (400-1000 mg) plus codeine (10-60 mg), paracetamol (325 mg) plus tramadol (32.5 mg). A large number of commercially available compounded analgesics contain a large quantity of paracetamol thus precluding the use of multiple tablets to achieve an adequate amount of opioids. Therefore the clinician must pay a particular attention to the amount of paracetamol in commercially available formulations so that the maximum daily dose of paracetamol is not exceeded. Patients should be warned about the over-the-counter analgesic preparations containing paracetamol when they are taking prescription drugs.

NSAID combinations

Opioids such as codeine, hydrocodone and oxycodone are combined with aspirin or ibuprofen to manage acute dental pain. Combinations of ibuprofen 400 mg and codeine 60 mg/hydrocodone 15 mg is superior to ibuprofen 400 mg alone. Ibuprofen 400 mg and oxycodone 10 mg provide a fast onset of relief from dental pain than ibuprofen 400 mg alone. Tramadol has been shown to allow for dose-sparing with ibuprofen and naproxen.^{14,15} Combining tramadol 100 mg with flurbiprofen 100 mg is adequate to relieve pain after pulpectomy.

Summary

NSAIDs are the first line drugs for mild-to-moderate pain and can be optimized by preoperative administration and by combining on a regular schedule to minimize pain and inflammation.

Paracetamol's analgesic effect is synergistic when combined with NSAIDs.

After optimization with NSAIDs and paracetamol and if the pain still persists combining an opioid may be considered.

Pharmacological management of acute and postoperative pain in dental practice

In the event opioid is combined, opioids should be prescribed separately to avoid paracetamol overdose.

Table 1. Nonsteroidal Anti-inflammatory Drugs (NSAIDs)

Drug	Dosage
Ibuprofen	400–800 mg tid/qid
Flurbiprofen	50–100 mg tid
Ketoprofen	25–75 mg tid/qid
Naproxen sodium	550 mg bid
Diflunisal	1000 mg STAT, then 500 mg q8-12 h
Diclofenac potassium	50-100 mg STAT, then 50 mg tid
Celecoxib	200 mg qd/bid
Paracetamol	500–1000 mg tid/qid

(tid, three times a day, qid, four times a day, bid, twice a day, STAT, q8-12h, every 8-12 hours.)

Table 2. Stepped approach for managing postoperative pain

Suggested regimens	
Step 1	Ibuprofen 400-800 mg tid/qid or equivalent NSAID And/or Paracetamol 500-1000 mg qid
Step 2	Add any of the following to Step 1 regimen: Oxycodone 5-10 mg or Morphine 15 mg 1 or 2 tabs q4hPRN Or Pentazocine/NX 50 mg or Tramadol 50 mg 1 tab q4h PRN Or Use combinations, provided no Paracetamol included in Step 1 HC/APAP 5-10/500 1 or 2 tabs q4h PRN Or OC/APAP 5-10/500 1 or 2 tabs q4h PRN Or Pentazocine/APAP 1 or 2 tabs q4hPRN Or Tramadol/APAP 1 or 2 tabs q4h PRN

(tid, three times a day, qid, four times a day, q4h PRN, every 4 hours as needed. APAP, Paracetamol; HC, hydrocodone; OC, oxycodone. Adapted from Becker 2010.)

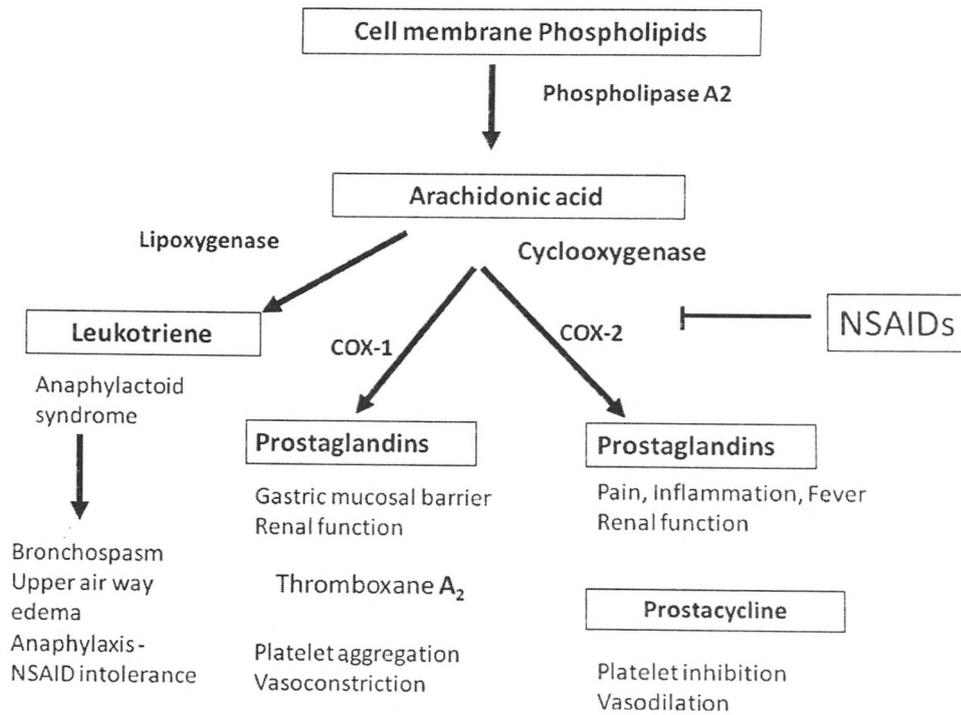


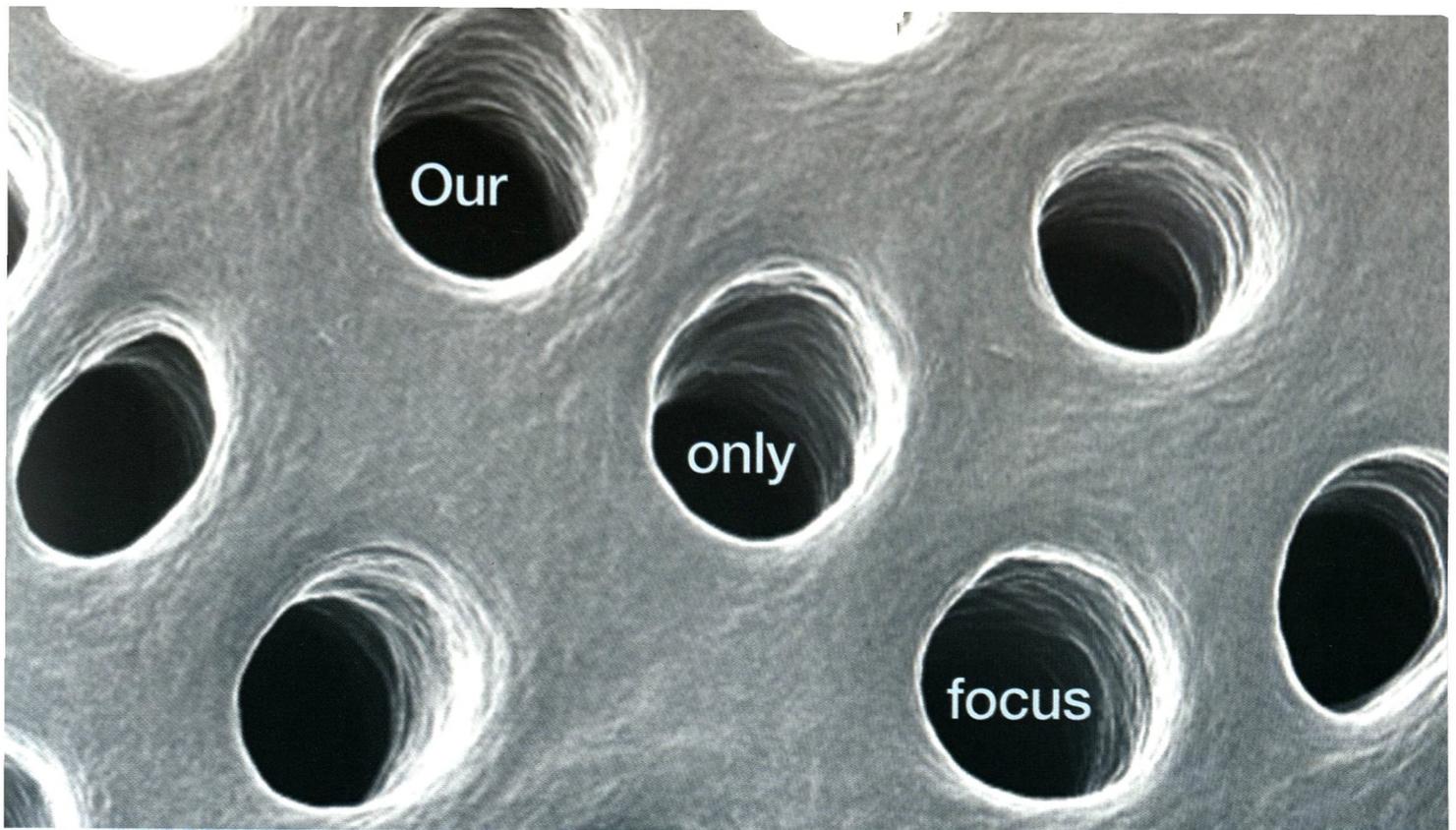
Figure 1. Synthesis and function of prostanoids. Exogenous and endogenous stimuli triggers the activation of phospholipase A₂ releasing the arachidonic acid from the phospholipids in the cell membranes. COX enzymes (COX-1 and COX-2) convert this fatty acid into various prostanoids unique to the particular cell or tissue including prostaglandins, thromboxanes, and prostacyclin each of which has particular function. Arachidonic acid is also a substrate for lipoxygenase that catalyzes the formation of leukotrienes which is implicated in causing anaphylactoid syndrome.

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By-passing local dental clinics for out-patient oral health care

Pushpika Abeyssekara and Lilani Ekanayake

Abstract

Aim: to assess the extent and factors associated with the bypass of local dental clinics to obtain out-patient oral health care at a General Hospital.

Methods: The sample consisted of 422 patients who visited the out-patient dental clinic of the General Hospital Polonnaruwa. An interviewer administered questionnaire was used to collect the data.

Results: Of the sample 47% had by-passed the nearest local hospital to obtain care at the dental clinic of the tertiary care institution considered. The majority of patients (46%) had bypassed the local hospital and visited the tertiary care institution while on a visit to the city for some other purpose. A multiple logistic regression analysis revealed that age, level of education, employment status and type of treatment perceived were independently associated with the bypass status.

Conclusions: The findings indicate that nearly a one half this group of outpatient dental clinic attendees had bypassed the local dental clinic for a combination of reasons.

Keywords: bypass, dental clinics, out-patient care, Sri Lanka.

Introduction

The term "health care bypassing" is used to indicate the receipt of health care from a facility located farther away than the one closest to the place of residence.¹ The non-use of proximal health facilities is a common problem associated with health care systems all over the world and is a concern for health policy makers. It is well known that despite the availability of comparable care at local hospitals, many patients choose to bypass local hospitals and visit distant health care institutions to obtain health care. A recent national study conducted in the USA has shown that overall 32% of respondents had bypassed their local health care professionals for primary medical care and the rate ranged from 9-66% across the sampled hospitals.¹ In an early study conducted in Sri Lanka it has been reported that 35% of mothers had bypassed primary level natal care services to obtain care from tertiary care institutions while in rural Tanzania 41% of women who had delivered a child in a health facility had bypassed the nearest facility to the place of residence.^{2,3}

Health care bypassing could have detrimental effects on both the local and distant health care institutions. It could deprive the local professionals and the local community of revenue, may lead to wastage of allocated resources, reduce the number of health care professionals and range of services offered or even closure of

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local hospitals.¹ Over crowding and over utilization of distant secondary and tertiary care institutions are major adverse effects of the bypassing phenomenon. Overcrowding can lead to a decrease in the quality of services provided while over utilization can lead to a depletion of physical resources.⁴ In addition overcrowding can increase the waiting time for patients. Bypassing proximal health care facilities could also have adverse effects on the patients such as increased transportation costs, longer distances to travel and particularly in the case of daily wage earners they would have to forego a day's income when visiting distant hospitals.

Several studies have been conducted to determine why patients bypass proximal health care facilities in favour of higher level hospitals. However, it is noteworthy that these studies have been confined to the use of medical care. To the best of knowledge, no study has attempted at investigating the bypass of local facilities for oral health care. Therefore the present study assessed the extent and factors associated with the bypass of local dental clinics to obtain out-patient oral health care at the General Hospital, Polonnaruwa.

Material and Methods

Ethical Approval for the present study was obtained from the Ethical Review Committee of the Faculty of Medicine, University of Kelaniya. Informed written consent was obtained from all participants.

The study setting was the out-patients dental clinic of the General Hospital Polonnaruwa and the study population consisted of patients aged 18 years and above attending this clinic. The General Hospital Polonnaruwa is the only state sector tertiary care institution in the district of Polonnaruwa and it functions as a referral centre for 20 state sector hospitals in the district. Clinic attendees who had been given appointments, those who were physically and mentally challenged and those residing outside the Polonnaruwa district were excluded from the study.

The sample size was determined using the formula for estimating a population proportion with absolute precision. As data on the percentage of patients bypassing local hospitals for oral health care is not available, the percentage bypassing was considered as 50%. When the expected population proportion is not known, the safest choice for population proportion is considered to be 50%.⁵ Considering the above percentage, a confidence interval of 95%, a margin of error of 5% and 10% for non-respondents, it was necessary to include 422 patients in the sample. A systematic sampling technique was used to select the sample. On a given day, the first patient to be included in the sample was selected randomly and subsequently every fourth patient was selected according to the order that they visited the clinic on that particular day. If the selected patient had to be excluded based on the exclusion criteria, the next patient was considered. The 422 patients to be included in the sample were selected from those attending the out-patients dental clinic during a period of 26 days from 22/07/2010 to 17/08/2010.

An interviewer administered questionnaire was used to collect the data. The questionnaire consisted of 19-items to obtain information about socio-demographic data, type of treatment perceived for the oral condition, the nearest state sector hospital with a dental clinic to the place of residence, distance from the place of residence to that clinic and also to the General Hospital, Polonnaruwa and cost of transportation to visit the general hospital. The questionnaire was pre-tested among a group of patients attending a dental clinic in a tertiary care institution in another district and based on the findings certain questions were rephrased for better clarity. The data were collected by the first author and two others who were trained by the first author. The interviewers had a comprehensive knowledge about the district and were capable of locating the nearest health care institution with a dental clinic to the patient's place of residence. The interviewers verified the patient's response to

the question “what is the nearest hospital with a dental clinic to your place of residence?” by checking with his/her home address. The patients were interviewed in three separate rooms away from the waiting area of the clinic. Written informed consent was obtained from all respondents. Permission was also obtained from the Regional Director of Health Services and the Regional Dental Surgeon of the Polonnaruwa district to conduct the study.

SPSS 13.0 was used for statistical analysis. For the purpose of this study “bypass” was defined as the non use of proximal oral health care facility to the place of residence. The associations between categorical variables were determined by Chi square test. Having checked for multicollinearity, those variables that were significantly associated ($P < 0.05$ level) with the bypass in the bivariate analysis were included in a binary multiple logistic regression model to determine the independent associations with the dependent variable-bypass.

Results

The mean age of the sample was 38.3 years (SD ± 12.4) and the majority consisted of females (55%). Of the sample 47% had by-passed the nearest local hospital to obtain care at the dental clinic of the tertiary care institution. The total number of local dental clinics bypassed was 11.

Table 1 shows the associations between socio-demographic variables, treatment perceived for the oral condition and bypass status. By-pass status was associated with age, level of education, employment status and treatment perceived for oral condition. In nearly 45% of those who bypassed, the distance to the closest hospital from the place of residence was 5 kilo meters or less while 48% indicated that it was $>5-10$ km away from home. To reach the tertiary care institution, a patient who bypassed a local hospital had travelled on the average a distance of 34 km. Nearly 44% of those who had bypassed the local hospitals had spent over 80 rupees as transpor-

tation costs to visit the tertiary care institution (Table 2). The reasons for bypassing local dental clinics and seeking care at the tertiary care institution are given in Table 3. The majority of patients (46%) had bypassed the local hospital and visited the tertiary care institution while on a visit to the city for some other purpose and 6% stated that they bypassed the local hospital because the necessary treatment was not available there. A multiple logistic regression analysis revealed that age, level of education, employment status and type of treatment perceived were independently associated with the bypass status. The odds of bypassing was higher in those who perceived that they needed advanced care compared to those who perceived that they needed simple care (OR=2.48; 95% CI=1.43-4.30). The odds of bypassing were 38% (0.62-1.00) lower in the employed compared to those not employed.

Discussion

A review of the literature indicated that the health care bypass phenomenon has been assessed with regards to the utilization of medical care and therefore the findings of the present study had to be compared with those studies.

In the present study by-passers were considered as those who did not obtain care for their oral health problem from the nearest oral health care facility to their place of residence. Accordingly 47% of out-patient dental clinic attendees had by-passed a total of 11 local dental clinics in the district. Akin and Hutchinson in a comprehensive study to determine health care facility choice and the bypass phenomenon in one district in Sri Lanka found that 11%, 30% and 58% had bypassed minor public western facilities, private western and Ayurvedic facilities to obtain care at a chosen facility.⁶ In a recent study Kahabuğa *et al*, reported that 59% of caretakers of under 5 year old children had not utilized the nearest primary health care facility during a child's sickness.⁷ A study conducted among seven states of the USA found that 45% of rural

patients had bypassed the local rural hospital.⁸ This indicates that bypassing proximal health care facilities for medical care is not only limited to developing countries but is a common feature in developed countries as well.

A person may bypass a local health care facility for various reasons. According to Akin and Hutchinson it is a definite indication of problems with the quality of care offered at the bypassed facility or it may be because better care is provided at the alternative source of care.⁶ Studies have shown that lesser the satisfaction with the quality of care provided at the local hospital, greater the likelihood of bypass.^{1,9} According to the reasons cited for bypass by the participants of this study, it appears that patient convenience was the foremost; a majority had either visited the city or the tertiary care institution for some other purpose and during such a visit they had attended its dental clinic to obtain care. In addition some participants have cited lack of facilities at the local clinic, closed dental clinic and the provision of better care at the tertiary care institution as reasons for bypass. However, surprisingly none of the participants have cited dissatisfaction with the quality of care provided at the local dental clinic as a reason for bypass.

Four variables were independently associated with the bypass status. Conforming to the findings of Roh and Moon age was associated with the bypass status.¹⁰ Compared to the 18-24 year olds, the older age groups were more likely to bypass the local dental clinic. Also those who were employed were less likely to bypass the local dental clinic than those who were not employed. This is to be expected because those who are not employed may have the time to visit places away from the place of residence than those who are employed. The level of education was negatively associated with the bypass status and is in agreement with the findings of Liu *et al.*¹ Also the odds of bypassing were significantly higher in those who perceived that they would need advanced treatments for their oral

problems compared to those who perceived that they needed simple treatments such as simple restorations, extractions and scaling. There are two explanations for this finding. Firstly, it may be due to the perception that advanced type of procedures such as root canal therapy, treatment for dental fluorosis and orthodontics are not carried out at local hospitals. Secondly, having visited the local clinic these patients may have been told by the dentist there to seek treatment at the tertiary care institution. With regards to bypass of medical services similar findings have been reported. Saunders *et al.* have reported that the more medically complex the patient, the more likely that he/she would seek care at a non-local hospital.¹¹

Bypass phenomenon has been assessed in relation to geographical factors such as the distance between a local facility and the place of residence and the time needed to travel that distance.¹⁰ Roh and Moon in their study found that as the distance between a patient's residence and the local hospital increased the likelihood of bypass also increased.¹⁰ The results of the present study agree with that finding. The nearest dental clinic was over 5 km away from the place of residence for a majority of patients (55%) who bypassed the local dental clinic. It is noteworthy that those who bypassed their local dental clinic had to spend on the average about 85 rupees as transportation costs to visit the tertiary hospital which is quite a high figure in the Sri Lankan economic context.

There are a few limitations to this study. As the present study was conducted in one district of Sri Lanka the findings could not be generalized to the Sri Lankan population at large. Also it is plausible that response bias may have influenced the findings. The study setting was the outpatient dental clinic of the General Hospital, Polonnaruwa and therefore it is possible that some participants may not have responded honestly.

In conclusion, the findings indicate that nearly a

By-passing local dental clinics for out-patient oral health care

one half of this group of outpatient dental clinic attendees had bypassed the local dental clinic for a combination of reasons. As bypass of local hospitals could have detrimental effects on the health care delivery system, some countries have implemented referral systems. The health care delivery system in Sri Lanka does not have

a proper referral system and therefore it is recommended that health authorities consider the development of such a system as a priority. This may improve the utilization of local hospitals and reduce over utilization/ overcrowding of tertiary hospitals.

Table 1. Associations between socio-demographic variables, types of treatments perceived for oral condition and bypass status

Variable	Bypass status				P value
	Bypassed		Not bypassed		
Age in years	N	%	N	%	
18-24 (67)	24	35.8	43	64.2	
24-40 (192)	107	55.7	85	44.3	
41-55 (112)	51	45.5	61	54.5	
>55 (51)	17	33.3	34	66.7	0.004
Sex					
Male (187)	79	42.2	108	57.8	
Female (135)	120	51.1	115	48.9	0.07
Ethnicity					
Sinhala (279)	139	49.8	140	50.2	
Tamil/Moor (143)	60	42.0	83	58.0	0.13
Education (years)					
0-5 (77)	47	61.0	30	39.0	
6-10 (241)	93	38.6	148	61.4	
>10 (104)	59	56.7	45	43.3	<0.001
Marital status					
Married (276)	140	50.7	136	49.3	
Never married (113)	46	40.7	67	59.3	
Divorced/widowed/separated (33)	13	39.4	20	60.6	0.13
Employment status					
Employed (194)	81	41.8	113	58.2	
Not employed(228)	118	51.8	110	48.2	0.04
Type of care perceived for oral condition					
*Simple care (302)	137	42.8	183	57.2	
**Advanced type of care (102)	62	60.8	40	39.2	0.002
Total	199	47.2	223	52.8	

* includes extraction of teeth, simple restorations, scaling

** includes root canal therapy, orthodontic treatments, treatments for traumatized teeth, dental fluorosis

Table 2. Geographic characteristics and transportation costs in those who bypassed (n=199)

Variable	N	%
Distance from place of residence to the nearest state sector hospital dental clinic (Km)		
Up to 5	89	44.8
>5-10	95	47.7
>10	15	7.5
Mean (\pm SD) distance (Km)	6.1 \pm 3.6	
Distance from place of residence to the tertiary care institution (Km)		
<15	20	10.0
>15-30	53	26.6
>30-45	65	32.7
>45	61	30.7
Mean (\pm SD) distance (Km)	34.1 \pm 13.9	
Transportation costs to tertiary care institution (Rupees)		
<40	45	22.6
>40-80	67	33.7
>80	87	43.7
Mean (\pm SD) transportation cost (rupees/cents)	85.50	56.80

Table 3. Reasons for bypassing local state sector dental clinic and seeking care at tertiary care institution (n=199)

Reasons *	N	%
Necessary treatment not available	12	6.0
Unpleasant experience at the local dental clinic	2	1.0
Reputation of tertiary care hospital for providing a good service	21	10.6
To get better care	4	2.0
Availability of facilities for special investigations at tertiary care hospital	11	5.5
Dental clinic at local hospital not functioning	31	15.6
On a visit to attend a medical clinic in tertiary care hospital	38	19.1
On a visit to the city for some other purpose	92	46.2
Accompanied a patient to tertiary care hospital	20	10.1
Bypassed for no apparent reason	29	14.6
Others	10	5.0

* Multiple responses allowed

Table 4. Multiple logistic regression analysis for factors associated with bypass status (n=422)

Variable	Odds ratio	95% CI	P value
Age group in years			
18-24	1.00		
24-40	4.61	2.32-9.15	<0.001
41-55	4.21	1.93-9.19	<0.001
>55	1.75	0.69-4.48	0.24
Education (years)			
0-5	1.00		
6-10	0.34	0.19-0.62	<0.001
>10	0.91	0.45-1.81	0.78
Employment status			
Not employed	1.00		
Employed	0.62	0.40-0.95	0.02
Type of care perceived for oral condition			
Simple care	1.00		
Advanced type of care	2.48	1.43-4.30	0.001

Bypass status dichotomized as 0= not bypassed; 1= bypassed the findings indicate that the bypass rate was high among this group of outpatient dental clinic attendees.

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Assessment of workforce; Dental Laboratory Technicians (DLTs) in the department of health, Sri Lanka

Dileep De Silva, Jayasundara Bandara, N.T. Gamage

Abstract

Objective: This survey was carried out to analyse the shortage of Dental Laboratory Technicians (DLTs) in the Department of Health and to suggest remedial action.

Methodology: A postal questionnaire was used to collect information from all DLTs employed by the Department of Health.

Results: The Department of Health has a relatively young, experienced workforce of DLTs. They are mal distributed with no DLT in the northern and eastern provinces of the country. Vast majority of them (92%) had received only the basic training. There is an acute and short-term shortage of DLTs in the department of health.

Conclusion: The Department of Health should consider a short term solution for the existing problem. Starting of a new school for DLTs should be considered only after a thorough investigation issuing an appropriate methodology.

Introduction

Dental laboratory technicians (DLTs) are skilled craftsmen much like the goldsmiths and the ironsmiths of yore, who will work on our dental defects and build the prosthetic solution that

the dentist has recommended. The end products of these modern day smiths or more commonly known “dental technicians” are dentures, crowns, bridges and orthodontic appliances. It is stated that a DLT should possess technical skills, should be detail oriented and have manual dexterity.¹

Globally, the trend till about the previous decade for dental technician was that most of them received training while on the job and did not pursue any particular course to gain knowledge or the experience. But there have been significant changes in the past few years and technicians with formal training are being preferred over the non-qualified technicians. Formal education programs are available for dental laboratory technicians through vocational schools, community colleges, and universities. Most programs take 2 years to complete. Moreover in some countries DLT has to be registered and licensed to practice. For example the National Board for Certification in Dental Laboratory Technology (NBCCERT) offers certification as a Certified Dental Technician (CDT) in the USA.²

The DLTs work directly with dentists by following detailed written instructions and using impressions (models) of the patient’s teeth or oral soft tissues to create:

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- full dentures for patients who are missing all of their teeth;
- removable partial dentures or fixed bridges for patients who are missing only one or a few teeth;
- crowns, which are caps for teeth that are designed to restore their original size and shape
- veneers, that enhance the aesthetics and function of the patient;
- orthodontic appliances and splints to help straighten and protect teeth
- Surgical appliances

The dental technicians work with a variety of materials in replacing damaged or missing tooth structure. These include waxes, plastics, precious and non-precious alloys, stainless steel, a variety of porcelains and composites or polymer glass combinations.

There are several advantages of a Dental Laboratory Technology Career; such as flexibility, independence, creativity, security and personal fulfilment. With advancements in technology and materials, there is an increased demand for restorative and cosmetic dentistry. As a result, there is currently a great demand for dental laboratory technicians. The employment opportunities will be excellent well into the next couple of decades.² Most dental laboratory technicians work in commercial dental laboratories. The average laboratory employs about five to ten technicians who may provide a full range of dental prosthetic services, or specialize in producing one particular type of prosthesis³ (e.g., removable partial dentures, crown and bridge, etc)

Having considered the global scenario in a bird eye view, let us now consider the situation in our country. The modern day DLT is a key member of the dental team in Sri Lanka. Further DLT is one of the two types of formally trained dental auxiliaries in the department of health; namely Dental laboratory technicians and School dental therapists. In Sri Lanka both DLTs and School

dental therapists, need no registration or license to practise their profession.

The dental technician has to work to the “prescription” of the dentist. The department of health is the single largest employer for dentists in Sri Lanka. It accounts for nearly 1350 out of 2000 active dentists in the country^{4,5}

The dental technician students are selected by the Ministry of Health after advertising in the government gazette. To be considered for selection an applicant must have 6 passes with 4 credits at GCE Ordinary Level and 3 passes with credit pass for biology at GCE Advanced level examination. Once recruited they are sent to Faculty of Dental Sciences university of Peradeniya for a 2 year training programme and on successful completion of the training, they are appointed as Dental Laboratory technicians to the government hospitals. Over the years the DLTs were appointed to the hospitals where there were dental specialists.

Over the past 15 -20 years the maximum number of DLTs trained per year at the University of Peradeniya had remained at 6. These six training slots had to be shared by the University, Military and Department of Health. This had resulted in allocating on average 2-3 training slots to the department of health annually.

While the training of DLTs were limited and restricted, the principal service recipients of DLTs, namely the specialists in Maxillo Facial Surgery, Orthodontics and Restorative Dentistry had been growing rapidly over the same period.⁵ Resulting in a shortage of DLTs, to provide dental laboratory services to ever increasing number of dental specialists. Therefore even though dental specialists were appointed to hospitals in many districts of the country, they could not provide their services at optimum level to the patient. This had resulted in long waiting lists (in some hospitals more than 3 years) for specialised dental services such as Orthodontics, while putting

strain on Dental & maxillofacial surgeons and specialists in Restorative dentistry to delivery urgently needed appliances for cancer patients awaiting surgery.

In this backdrop the health authorities of the Ministry of health are considering various options to tackle the shortage of DLTs. One suggestion is to start a new training school for DLTs. While above described situation prevails in the department of health, there is a paucity of published research on dental laboratory technicians in Sri Lanka. From the point of view of the technicians this had contributed negatively to their career advancement and professional development. Further lack of management information had adversely affected the Dental Health Human Resource planning at National Level. Due to the absence of information on dental laboratory technician workforce; ill conceived, inappropriate and ill-timed decisions about recruiting, training and employing them may occur. Some of these decisions may end up in overproduction of DLTs, which may even lead to dental quackery, which is rampant in the private dental care sector in the country.⁶

The information pertaining to the available DLT workforce is a necessity to analyse the supply dynamics of the dental laboratory services, while an analysis of the existing dental specialists who obtain the services of DLTs as well as the future employment projections for dental specialists will be needed to ascertain the demand dynamics for the dental laboratory services.

Objectives

The general objective of this research is to describe the workforce profile of dental laboratory technicians; in order to facilitate their training needs and Dental Health Human Resource planning from the department of health perspective.

Methodology

Lists of DLT employed by the Department of Health were obtained and updated with the help

of provincial and local health authorities. These names were further scrutinized with the membership list of Government dental laboratory Technicians Trade Union. Further data pertaining to the DLT undergoing training at Faculty of Dental Sciences, University Peradeniya was obtained from the University of Peradeniya.

With expert opinion it was decided to involve the entire population of DLTs without considering a representative sample. The decision will enhance the validity and acceptability of the study.

Study Instrument

The survey on DLTs was based on postal questionnaire sent to all DLTs working in the department of health. The facts that DLTs are scattered throughout the country, Sri Lanka has a well-organized postal service, and the low cost involved, weighed in favour of the decision to use a postal questionnaire, as opposed to other data collection tools.

The questionnaire was prepared in the English, as it is a common language understood by all DLTs from different ethnic communities in Sri Lanka. The questionnaires was pre-tested for clarity and interpretation of the questions in a pilot survey, and modifications were done where appropriate.

Conduct of the survey

Before sending the questionnaire to DLTs, publicity was given through the DLT Trade Union communication channels. The questionnaire was accompanied by a personally signed covering letter by the 1st author, which explained the purpose of the research and assured confidentiality. A stamped self-addressed envelope was enclosed along with the postal questionnaire. One week after posting the questionnaire, all the DLTs were sent a reminder asking them to respond, if they had not already done so.

A detail analysis of the distribution of existing

dental specialists and future projections were carried out using records available in the directorate of dental services, department of health.

Results

Post questionnaires were sent to 29 DLTs and 26 responded giving a response rate of 90% .

Geographical Distribution

The Provincial distribution of dental specialists (the main service recipients of DLTs) and DLTs as at July 2012.

Discussion

High response rate of 90% to the questionnaire is a noteworthy achievement. There is a maldistribution of dental specialists as well as DLTs. While the majority of both categories were concentrated in the western province there were no dental specialists and hence no DLTs in Northern and Eastern provinces of the country. A similar picture was seen in the distribution of non specialist dental surgeons and general dental practitioners in Sri Lanka.⁴

The DLT workforce is relatively young (average age of 42 years) and consisted of 58% males and 42% females. The average number of years of work experience was relatively high at approximately 10 years. Majority of them (81%) were married and their spouses were gainfully employed. On the assumption that DLTs will continue to work until their normal retirement age of 60; only two of them will retire from the department health, within next 5 years.

Any discussion on workforce planning should begin with a note about the training capacity for the relevant manpower. Sri Lanka has only one institution which trains dental specialists; namely the Post Graduate Institute of Medicine (PGIM) University of Colombo. Similarly Dental Laboratory Technicians are also trained in a single training institution, namely the Faculty of Dental Sciences University of Peradeniya.

While all the DLTs have followed the basic

training, less than 8% have undergone any advance training. This may have affected the professional development and career progression of the DLTs and hence the moral and work output. The department of health should consider providing advance training for at least 40% of the existing DLTs by coordinating with training provider- the Faculty of Dental Sciences University of Peradeniya.

There are 37 vacant approved cadre positions for dental specialists up to 2015. However only 35 are undergoing training at present to become specialists. Further considering the duration of training it is estimated that only 28 out of above 35 will become specialists by 2015.

Considering the age distribution of existing DLTs, approved new cadres for dental specialists on a provincial basis and the number of specialist trainees (PGIM trainees), the number of new DLTs needed by 2015, as per expert opinion is estimated at 20.

If considered in a very conservative manner it could be argued that Dental & Maxillofacial units and Restorative units could function though at below optimum level, even in the absence of DLTs. However DLT's services are essential to commence an orthodontic unit. Moreover taking into account the duration of training it is envisaged that only 12 out of 14 orthodontic trainees will become specialists by 2015. Therefore it could be argued that there is need for a minimum of 12 new DLTs by 2015.

Therefore we are discussing an issue of training between a "minimum" of 12 and an "adequate number" of 20 new DLTs by 2015. Confounding the issue is the duration of training, which is 2 years, the annual maximum capacity for training at the Faculty of Dental Sciences, which is fixed at 6 and the retirement of existing manpower.

At present there are 3 students undergoing the DLT training programme at the Faculty of Den-

tal Sciences. They are due to qualify by end of 2013. The batches due to start training in January 2013 and January 2014 will qualify in December 2014 and December 2105 respectively. Therefore in total 15 DLTs will qualify by end of 2015. However at least two DLT is estimated to retire by 2015. This is give a net of 13, which is just above the minimum number of DLTs required by the Department of Health by end of 2015. However the above calculation is based on the assumptions that the Faculty of Dental Sciences will allocate all its 6 training slots to the department of Health in two consecutive years of 2013 and 2014 and DLTs will retire at 60 years.

With the adding of 13 DLTs to the department of health by end of 2015, especially to the provinces where there is a severe shortage, it will create a situation where at least an “acceptable” level of dental laboratory services could be sustained, where in an ideal scenario about 20 DLTs are in need.

Considering the fact that once a dental lab is established it could cater for several dental specialists in different specialties, the need of DLTs in proportion to the rising number of specialists, will decline in the long run. Accordingly to expert opinion, once the existing acute shortage is addressed, an annual intake of around 3 DLTs would be sufficient to continue the services at optimum level. When the demand and supply for dental laboratory services matches, the new comers will be mainly replacing the retiring DLTs.

Above manpower planning is based on the province wise availability of the dental specialists who are the service recipients of DLTs, but not on the capacity of the service providers (DLTs). The accuracy and validity of the above planning will definitely enhance if the latter parameter also would be considered in the equation.

A question may be paused as to why department

of health cannot train DLTs for its requirement. Though the department of health may have the capacity to commence a school for dental laboratory technicians one must be skeptical about the long term viability and the service requirements. Also the support and cooperation extended by the existing DLTs will be vital for the functioning of a training school, as they will be doing much of the “hand-on practical” training. As explained the department of health is currently facing an acute shortage of DLTs. This is a short term problem. Trying to find a long term solution such as starting a school for dental laboratory technicians it is not the best of options. Wisdom of such a long term solution for a short term issue will be challenged in system thinking, where the emphasis is on the entire system but not on a single problem or an issue.

There will be no return on investment if the school has to be shut down within few years of commencement due to overproduction of DLTs or any other reason.

However starting a new school for dental laboratory technicians, after a proper scientific evaluation considering the entire system of dental care provision in the country, would be appropriate. In this perspective one has to consider the supply and demand for DLTs in the private sector also, which is the engine of growth of dental services in this country.⁷ Based on system thinking if a new school for DLTs is started it should be able to cater not only to the department of health but also to other government agencies such as the military, university and the ever going private sector. If everything goes well Sri Lanka can even cater for the export market.

With the availability of more and more qualified DLTs in the private sector they will be better distributed in the country. Therefore the General Dental Practitioners who are spread throughout the country will be able to provide a better service to their patients, especially in treatment for orthodontic problems and advanced restorative

care such as crown , bridges and implants. This will enhance the outlook of the entire profession to match with that of a middle income earning country.

Conclusion

What is more logical would be to try to influence the Faculty of Dental sciences to recruit more trainees or at least to reserve all the training slots to the department of health for the next 3 batches or a combination of both to overcome the acute shortage of DLTs currently experienced by the department of health.

Though well-intended, established planning methods have tended to be overly simplistic and narrow in focus, ignoring for example, the often significant effects of changing health needs of

the population and the productivity of the workforce. Reliance on such planning practices has sometimes resulted in short-sighted policies that have had serious negative consequences for the entire health care system. Therefore any proposal to start a new school for DLTs could be considered in line with system thinking and in this endeavor operational research methodology of system dynamics could be considered as a valuable tool.

Acknowledgement

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Table 1. Provincial distribution of dental specialists and DLTs. Source Directorate of Dental Services, Department of Health

Province	Dental & Maxillo-Facial	Orthodontists	Consultants in Restorative Dentistry	Dental Laboratory Technicians
Western	10	7	4	14
Southern	2	2	1	3
Central	2	2	1	4
North Western	3	2	1	4
North Central	2	1	-	2
Uva	1	1	-	1
Sabaragamuwa	2	1	-	1
Northern	-	-	-	-
Eastern	-	-	-	-
Total	22	16	7	29

New Cadres approved for dental specialists 2012-2015

Assessment of workforce; Dental Laboratory Technicians (DLTs) in the department of health, Sri Lanka

Table 2. Cadre projections for dental specialists 2012-2015. Source Directorate of Dental Services, Department of Health

Province	Dental & Maxillo-Facial	Orthodontists	Consultants in Restorative Dentistry
Western	3	3	4
Southern	1	1	1
Central	1	2	-
North Western	-	-	-
North Central	-	1	2
Uva	1	1	1
Sabaragamuwa	-	1	1
Northern	2	2	1
Eastern	3	3	2
Total	11	14	12

Number of dental specialist trainees employed by the department of health as July 2012

Table 3. Dental specialist trainees as at July 2012 .Source Directorate of Dental Services, Department of Health

Dental Specialty	Number of trainees in specialist training pathway
Dental & Maxillo - Facial surgery	12
Orthodontics	14
Restorative Dentistry	9
Total	35

Table 4. Projected Need for DLTs in the department of Health

Province	Dental Laboratory Technicians
Western	3
Southern	2
Central	2
North Western	1
North Central	2
Uva	2
Sabaragamuwa	2
Northern	3
Eastern	3
Total	20

Age

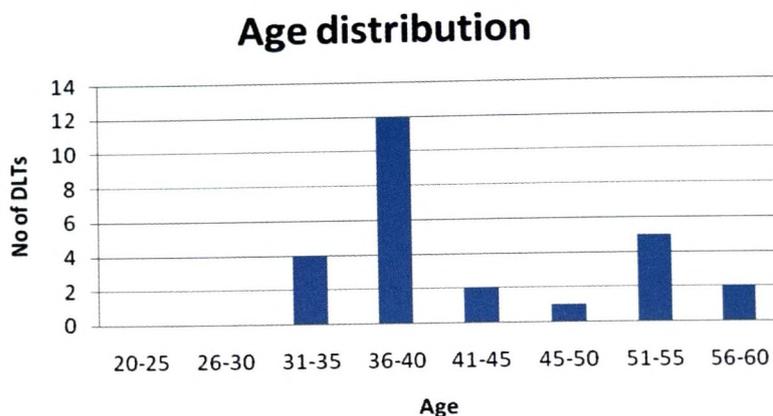


Figure 1. Age distribution of the DLTs employed by the department of health

Gender

Gender distribution

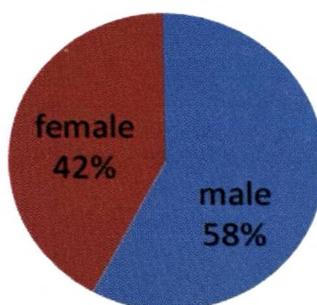


Figure 2. Gender distribution of the DLTs employed by the department of health

Civil Status

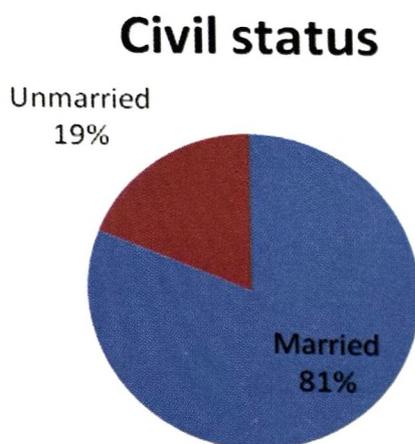


Figure 3. Civil status of the DLTs employed by the department of health

Working experience



Figure 4. Working experience of the DLTs employed by the department of health

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Survey on occupation related health injuries among dental surgeons in Sri Lanka

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Abstract

Objectives: The objectives of this study were to collect information from the dental surgeons in Sri Lanka about common occupation related health injuries that they face with, assess their knowledge about the occupation related health injuries and find out the precautions that they take in order to minimize occupation related health injuries.

Method and material: Dental surgeons whose names were appeared in the registration list of Sri Lanka Medical Council 2006 were used as the study sample of the present study. The information with reference to occupation related health injuries and other related general information of the dental surgeons were collected using specially designed postal questionnaire. Statistical package for the Social Sciences (Windoos 11.0 version) was used to analyse the data received from the survey.

Results: Response rate of the present survey was 24.2%. Most of the responded dental surgeons were in the age group between 30- 40 years. Majority of respondents were females (54.6%). Seventy one percent of the respondents had only a basic degree. Percentage of

respondents working in the government sector was 61. Most of the dental surgeons had a part time private practice. Fifty one percent of dentists practice 30-45 hrs per week. The percentage who had experience in some kind of an ORHI was 86%. Needle/sharp instrument injury, air borne infections and musculoskeletal pain were the most frequently reported ORHI. Statistically significant difference was observed with different age groups, educational level and number of hours practiced.

Conclusion: The results of this study suggest that the occupation related health injuries are a significant health issue among dental surgeons. Their knowledge and protective measures in this regard is not adequate and needs improvements.

Introduction

Occupation related health injuries (ORHI) are the issues or injuries pertaining to a particular job. All health workers including dental surgeons are at risk of ORHI due to the nature of their work.¹ ORHI include but not limited to musculoskeletal injuries, stress related conditions, infections via bio-aerosols or infectious body fluids from percutaneous injuries, respiratory and other communicable diseases like influenza acquiring

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from patients and staff, radiation induced injuries, injuries due to chemicals and allergic reactions etc.² Though there is a drastic reduction in ORHI due to advances in technology, findings of the recent studies with reference to dentistry reveal that the dental surgeons still do face with occupation related issues.^{3,4,5}

There are more than 2500 dental surgeons working in 25 administrative districts of Sri Lanka. They work in different sectors including state hospitals, private sector, armed forces and universities etc. To best of our knowledge, no data is available on ORHI of Sri Lankan dental surgeons and such data would be immensely useful in planning and carrying out educational and training programmes for them to reduce the work related injuries. Therefore the objectives of this study were to identify the common occupation related health injuries of dental surgeons and their knowledge about these issues and the precautions that they take in minimizing common occupation related injuries.

Method

The dental surgeons who were practicing in Sri Lanka in 2006 were used as the study population of the present survey. A list of said group of dental surgeons with their addresses was obtained from Sri Lanka Medical Council.

A postal questionnaire was used to obtain the data from the study group. The questionnaire was

developed after a thorough literature survey and consultation with experts in the fields of occupational health and public health. It was designed to obtain general information such as gender, age, date of graduation, duration of practice, place of work and specific information regarding the knowledge in ORHI, personal experience of them, safety precautions that they take in avoiding ORHI and attitude of them towards a training in ORHI. Information on Hepatitis B vaccination status and serum antibody titra were also obtained. Only close ended questions were complied in the questionnaire. The questionnaire was posted with a prepaid reply envelope and a covering letter to all the dental surgeons whose names appeared in the SLMC registration list in 2006. Anonymity and confidentiality were assured. In order to minimize the non respondent bias, a reminder was sent 3 weeks after the initial letter.

Statistical data analysis was done using the Statistical Package for Social Sciences (SPSS) version 11.5 and Chi- square test was used to analyse the statistical difference. A value of $p < 0.05$ was considered as statistically significant.

Results

Out of 1700 questionnaires, 37 were returned due to incorrect postal address. A total of 403 dental surgeons responded giving a response rate of 24.2%.

Table 1. Age distribution of the sample

Age group in years	Number	Percentage
less than 30	67	16.6
30-40	188	46.7
41-50	103	25.6
51-60	33	8.2
61-70	10	2.5
above 70	2	0.5
Total	403	100

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Table 1 shows that there were 2 (0.5%) dental surgeons above 70 years of age and still practising dentistry. The largest proportion of dentists belonged to the age groups between 30-40 (n=188, 46.7%) followed by the 41-50 (n= 103, 25.6%).

Table 2. Gender distribution of the sample

Sex	n	%
Male	220	54.6
Female	183	45.4
Total	403	100

Table 3. Grouping the dental surgeons according to professional qualifications

Qualification	Number	Percentage
BDS/LDS	286	71
BDS+Diploma/MSc	58	14.4
BDS+MD	12	3.0
BDS+MS/FDSRCS	28	6.9
BDS+Mphil/PhD	19	4.7

Table 3 shows that the majority of (n= 286, 71%) the respondents were BDS degree holders while dentists with MD/ MSc were the smallest (n= 12, 14.4%).

Table 4. Percentage of dental surgeons employed in different sectors

Nature of employment	Number	Percentage
Government	247	61.3
University	94	23.3
Armed forces/police	18	4.5
Full time private practice	40	9.9
Other	2	0.5
Not responded	2	0.5
Total	403	100

Table 4 shows that the largest number of respondents were from the government sector (n=247, 61.3%) and the full time private practitioners were only 10 %.

Table 5. Number of practicing hours per week

Hours per week	Number	Percentage
Less than 30	56	13.9
30- 45	208	51.6
46- 60	82	20.3
61- 75	36	8.9
over 75	10	2.5
not responded	11	2.7

Table 5 shows that the majority of the dental surgeons (n= 208, 51.6%) practise dentistry between 30-45 hours per week. Number of individuals who practice dentistry for more than 75 hours per week is minimal in the present sample (n=10, 2.5%).

Table 6. Number and percentage of individuals who has experienced at least single injury vs age groups

Age group in years	At least one injury	No injury	Total
less than 50	318 (90%)	40 (10%)	358 (100%)
More than 50	29 (65%)	16 (35%)	45 (100%)
Total	347	56	403

Table 7. Level of qualification vs experience of at least single injury

Qualification	At least one injury	No injury	Total
BDS/LDS	251 (88%)	35 (12%)	286
BDS+Diploma	52 (90%)	06 (10%)	58
BDS+MD/MSc	10 (83%)	02 (17%)	12
BDS+MS/FDSRCS	24 (85%)	04 (15%)	28
BDS+Mphil/PhD	10 (52%)	09 (48%)	19
Total	347	56	403

Table 8. Association between the number of hours practiced vs experience of at least single injury

Working hours per week	At least one injury	No injury
Less than 30	0 (0%)	11 (100%)
30- 45	56 (100%)	0 (0%)
46- 60	177 (85%)	31 (15%)
61- 75	74 (90%)	08 (10%)
over 75	30 (83%)	06 (17%)

Survey on Occupation Related Health Injuries among Dental Surgeons in Sri Lanka

Larger proportion of dentists (347, 86.1%) had experience of at least one injury during their practice. The commonest was a percutaneous injury by needles/ sharp instrument in the dental clinic followed by infections by air borne microorganisms and musculoskeletal pain. Statistically significant associations were observed in between ORI and age groups, educational level and hours of practice (Table 6,7,8).

Almost 90% of the dentists younger than 50 years had at least 1 injury while only 65% of the older age group had at least one injury ($p < 0.0001$) (Table 6). All four groups in the qualification grouping has had at least one injury (83%- 90%). But the group with MPhil and PhD; only 52% had at least one injury ($p < 0.007$). The dentists who worked less than 30 hours per week did not have any injury. However, the group who worked above 30 hours per week had injuries in the range of 83% to 100% (Table 8).

Majority of the dental surgeons wears gloves during patient treatment but wearing face masks and protective clothes during treatments are comparatively low. Those who wear protective eye devices during treatments are even less. Most of them wear gloves when they handle material used for patient treatment. Only a very few who work at the university use radiation monitoring devices during radiography (Table 8).

Table 9. Use of protective material during clinical practice

Protective mechanism	never	occasionally	sometimes	always	No answer
Wearing gloves	4	20	53	138	10
Wearing protective clothes	47	48	61	50	19
Goggles	132	37	19	12	25
Wearing gloves when handling waste	22	19	27	133	24
Wearing irradiation detection device	166	3	6	5	45
Bending neck/back during pt treatment	14	33	115	49	14
Simple office exercise	101	33	39	14	38

Table 10. Some variables with reference to occupational safety

Variable	Positive answer (%)
Take radiographs in the clinic	25
Had vaccination against Hep B	91
Aware of their antibody status	26
Had training on occupational safety	40
Facilities/knowledge satisfactory for occupational safety	30

Only 25% of the respondents takes radiographs during their work. Majority (91%) of the respondents had been vaccinated against Hepatitis B but only 25% of them are aware of their antibody status against Hepatitis B. More than half of the respondents has not had any training in occupational safety and almost half is satisfied about the facilities available at the work place.

Large majority of the dentists (88%) had adjustable dental chairs. Only 54% of the dental clinics had autoclaves for sterilization and 30% of them had air conditioning as a ventilation method. Moreover, 80% of the dentists had adjustable operator's chairs. Majority of the clinics (78%) had ultrasound scalers.

Table 11. Use of amalgam by the dental surgeons and their perception about mercury toxicity

Variable	Percentage of positive answers given
Use amalgam in the clinic	72
Concerned about the mercury toxicity	80

Table 11 shows, still a large number of respondents (72%) use amalgam in their clinics and 80% of them were concerned about the amalgam safety.

Discussion

Dental surgeons are one of the categories who always bear an occupational risk during the clinical practice. However, modern facilities and novel materials that they use substantially reduce the risk of ORHI. Acquiring proper knowledge, adopting systematic training and carrying out safety measures is mandatory in minimizing ORHIs.

A postal questionnaire survey is a simple and a useful method for data collection. This mode of study is cheaper and can cover a large population group dispersed over a bigger geographical area within a short period. However, the poor response rate is a major limitation in the method. The response rate of the present survey was only 24.2%. This response rate is much more lower than most of the similar studies. However, studies which have response rates within the range of the present study have also been reported.^{3,4,6} Poor response rate may be due to the incorrect or unrevised addresses appeared in the SLMC registration list. Recall bias may have also influenced the results.

Musculoskeletal pain (MSP) specially the lower back pain is one of the major health problems experienced by the dental surgeons.² It was the commonest (53.3%) ORHI found in the present study as well. However, this is a self identified

condition and it has not been confirmed by a medical examination. Therefore, possibility of false reporting, misinterpretation and/or overestimation cannot be excluded. Studies reported in other countries also revealed that MSP is the commonest ORHI experienced by the dentists.^{3,4,7} Percentage of dental surgeons who suffer from MSP is lower than the values reported in Australia (87.2%), Lithuania (90%) Greece (62%) and Thailand (78%) except Hong Kong (43%).^{3,4,7,8,9}

MSP is common among older age groups and those who work prolong hours. Dental surgeons who work at bending position during treatment procedures and those who did not carryout simple office exercise at their surgeries are the other categories among whom MSP is common. Occurrence of MSP is a result of the imbalance between force applied on the musculoskeletal system by repetitive movements/posture and the practice of preventive measures to give a rest to the system.

Percutaneous injuries by the sharp needles/instruments is a serious health hazard because this is the most common method of transmitting blood borne diseases between patients and dentists.¹⁰ Most of the studies have reported higher rates for sharp needle/instrument injuries among dentists. Present study also reported a

higher rate (48.2%) of needle/sharp instrument injuries in the dental clinic for the given period of 6 months. However, the rate has been reported as 16% for dentists practicing in Hong Kong.³ Australian survey also has reported a lower injury rate of 27.7% for a period of 12 month.¹¹

Personal protective wear such as gloves, face masks and eye protectors are important in minimizing the risk of spread of blood borne infections and dental surgeons must compulsorily wear them during treatments. Even though 89.4% of the respondents used gloves, it is less than ideal of 100%. Further, our glove wearing rate is less than the figures reported for other countries.^{3,13,14} Slightly lower figures had been reported among Australian Dentists.¹⁵ Skin reactions to gloves is a main factor for not wearing gloves in the dental clinic.¹² Reduction in perception, restricted finger movements and under estimation of risk of cross infections are the other negative factors for gloves wearing. Wearing face masks during patient treatment by the respondents in this study (64.2%) was much lower than the reported values in other countries. Usage of face masks was 97% in Hong Kong, and it was of 95% and 82.3% respectively in Canadian and Italian^{3,6,13} Wearing eye protectors is recommended during dental treatment, not only to minimize the physical damage but also to prevent spread of infections. Usage of eye protective devices was very poor (only 6%) in the present cohort of dentists and this is a peculiar difference in compared to other reported studies.^{3, 6, 15}

Hepatitis B vaccination can minimize the risk of acquiring the disease. However, the vaccination itself may not give the full protection in all cases. Therefore monitoring and regular assessment of antibody status is important and booster doses or repeated vaccination should be given if necessary. Vaccination rate against hepatitis B in respondents was (90%) highly satisfactory and the values are in agreement with the other reported studies.^{3,6,13} But only few respondents (25%) had got the antibody titra checked and the rate of antibody

titra re-evaluation is much lower than the other studies.^{3, 6,13}

Ionizing radiation can induce many injuries both somatic and genetic. This is considered as a risk factor in carcinogenesis. But the amount of radiation received by the dentists in their routine practice is minimal and such low doses are not associated with an increase risk of carcinogenesis.¹⁶ This study showed that the majority does not take radiographs themselves and no one has experienced any radiation related health problems so far.

Sterilization/disinfection of instruments and equipment used in the dental surgery is an important step in minimizing cross infections. Present study showed that various methods have been used by the respondents in sterilizing the dental instruments/equipments. Usage of autoclaves in sterilization is significantly low in the present sample compared to studies reported in other countries.¹⁷ Autoclaving is the best method to sterilize non-heat sensitive instruments/equipment at a dental surgery. However, comparison of present results with a similar survey carried out in 2006 showed there is a significant improvement in sterilization/disinfection methods used by the Sri Lankan dental surgeons.¹⁸

Amalgam has been in use as a restorative material for almost 200 years.¹⁹ There is a controversy over the safety of amalgam fillings and many diseases are associated with amalgam.^{19,20} Use of amalgam in dental clinics is becoming less popular worldwide. However, amalgam is still widely used in Sri Lanka. Present study showed that 71% of dentists use amalgam in their clinics. Similar to the findings reported in the literature, out of the total amalgam users, 80% were concern about the safety.²¹

Training in occupational safety is an important step in minimizing the ORHI. Different sets of guidelines applicable to dentistry have been published by various organizations.²² More than

half of the respondents had some training in ORHI and 47% out of total believes that their training on occupational safety is inadequate and need further training. Present study highlights the need of a training programme in occupational safety. Professional organizations must take steps to develop guidelines acceptable to local scenario and introduce new educational programmes and incorporate them into continuous professional development activities.

Conclusion

The result of this study shows that the occupation related health injuries are a significant health issue for dental surgeons working in Sri Lanka. Their knowledge and protective measures in regarding ORHI is not adequate and needs further improvements.

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Primary squamous cell carcinoma of parotid gland with prominent intra neural invasion

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Abstract

Primary squamous cell carcinoma in the parotid gland is an uncommon tumour representing less than 1% of salivary gland tumours. This tumour more often causes facial nerve paralysis clinically and shows frequent perineural invasion histopathologically. However, marked intraneural invasion has not been described before. The present article reports the first documented case of primary squamous cell carcinoma in the parotid gland with prominent intra neural invasion in a 47 year old female patient.

Key words: Parotid gland, Squamous cell carcinoma, Intraneural invasion

Introduction

Primary squamous cell carcinoma (PSCC) originating in the parotid gland is an uncommon malignant tumour.^{1,2} Several investigators have advocated that the diagnosis of PSCC of parotid

gland should be made following exclusion of high grade mucoepidermoid carcinoma or metastatic squamous cell carcinoma.^{3,4} The patients with squamous cell carcinoma of the facial skin, scalp, auricular or post auricular region presenting as a parotid tumor should be considered to have metastatic rather than primary lesion in the gland.^{5,6} PSCC of minor salivary glands is not a recognized entity as the mucosal origin cannot be excluded reliably. Nearly 80% of PSCC of salivary gland occurs in the parotid gland followed by submandibular gland (20%). PSCC of parotid most frequently occurs in 6th to 8th decades of life with a male preponderance. Patients usually present with a rapidly enlarging painful mass. Histopathologically PSCC of parotid is well to moderately differentiated and infiltrates the salivary tissues diffusely.⁷

Although it is sub classified as a high grade tumour, the clinical features and optimal mode

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of treatment for PSCC of the parotid gland are not yet fully understood. There seems to be very little information in the literature regarding the diagnosis and treatment options. Furthermore, only a small number of patients are included in most studies probably due to the rarity of the disease.^{4,8} In this report a case of 47yr old female with right side parotid swelling for 2 months duration with associated right side facial nerve paralysis is presented.

Case report

A 47yr old female patient presented with a firm and diffuse lump in right side pre auricular region with associated facial nerve paralysis. MRI revealed a right side parotid gland swelling with enhancing wall and cystic/necrotic centre suggestive of a neoplasm. FNAC was performed and showed predominantly squamous cells and orangiophilic material in the back ground of blood and tissue debris suggesting a malignant salivary gland tumour (Fig.1). Superficial parotidectomy was performed. Macroscopically, there was no obvious lesion observed other than suspicious cystic area. Microscopic findings revealed tumour composed of well differentiated squamous epithelial islands diffusely infiltrating into salivary parenchyma. A few areas showed cystic changes. Some tumour islands showed marked keratinization (Fig.2). There was marked perineural invasion with striking intra neural invasion in places (Fig.3). Significant stromal fibrosis was observed with minimal lymphoplasmacytic host response in most areas of the tumour. None of the other head and neck sites showed a primary lesion which excluded possibility of a metastatic squamous cell carcinoma. High grade mucoepidermoid carcinoma was excluded as special stains for mucin were negative. Therefore the diagnosis of PSCC of parotid gland was arrived.

Discussion

PSCC of parotid gland is a rare neoplasm, which approximately accounts for 0.3 – 9.8 % of all parotid malignant tumours.^{4,8,9} The average age

of PSCC of parotid gland ranges between 61-68yrs with a male predominance.^{3,8,10} Our case was presented in a 47yrs old female. Primary squamous cell carcinoma occurs in the parotid gland nearly nine times more often than in the submandibular gland.¹¹ In the parotid it almost exclusively occurs in the superficial lobe.⁸ The lesion confined to the superficial lobe in the present case. Pre operative facial nerve palsy is a common finding in PSCC of parotid gland which is compatible with our patient.¹²

Macroscopically PSCC of parotid is usually unencapsulated and difficult to distinguish from the normal surrounding salivary tissues.¹¹ The present case had the same difficulty in finding the lesion proper during macroscopic examination. Microscopically these tumours are well to moderately differentiated and have intracellular keratin and intercellular bridges but keratin pearl formation is less evident.¹¹ The present case shows well differentiated squamous cell carcinoma with prominent keratin pearl formation. Most tumors show marked perineural invasion leading to the facial nerve palsy which was marked in our case.^{7,11} In addition, the present case exhibited marked intra neural invasion which is not described in the English literature. A high incidence of cervical metastasis, both occult and palpable is another characteristic feature of PSCC of parotid gland.^{8,9,10} The present patient does not have palpable lymph nodes but could not comment on occult metastasis as the patient had undergone superficial parotidectomy without neck dissection. This is the treatment of choice for most of the patients with / without facial nerve preservation.

Ulceration or fixation, advanced patient age, advanced tumour stage and facial nerve paralysis are associated with poor prognosis.⁸ In our case none of the above poor prognostic features were present except the facial nerve paralysis. Parotidectomy is the treatment of choice for most of the patients with /without facial nerve preservation.² Gaughan *et al* recommended neck dis-

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section on all patients as he found 30% of the patients with no palpable lymph nodes, but microscopic disease. There appear to be some evidence that post operative radiotherapy may help the prevention of regional recurrence.^{3,8} In our case superficial parotidectomy was performed without neck dissection and post operative radiotherapy was given. The patient is on regular follow up.

To the best of our knowledge this is the first PSCC of parotid gland with prominent intra neural invasion reported in Sri Lanka.

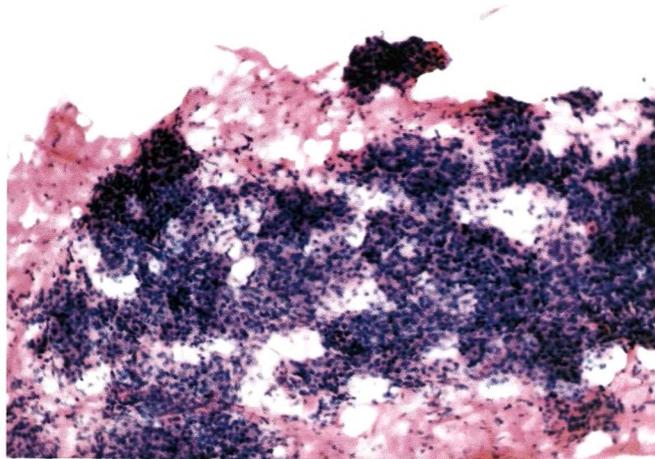


Figure 1. Squamous epithelial islands and orangeophilic material in fine needle aspiration biopsy

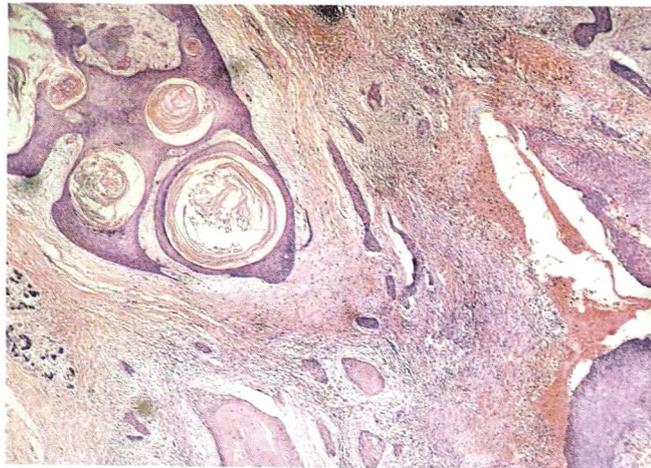


Figure 2. Islands of squamous cell carcinoma with prominent keratinization

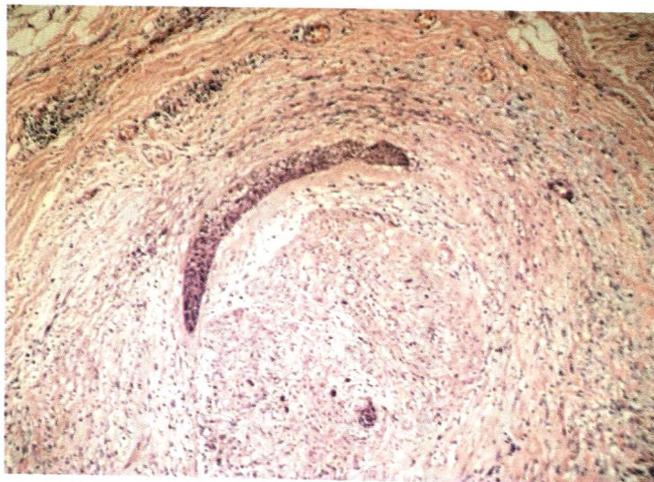


Figure 3. Marked perineural and intraneural invasion

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2. **Reviews** - Reviews are detailed surveys of published research pertinent to dentistry and associated sciences. They should be critical in nature and should not normally exceed 3000 words and 30 references.

3. **Research articles** - Articles resulting from research work belong to this group. Results from routine clinical examinations or laboratory investigations will not be considered under this category. Subjects may vary from clinical trials to basic science research, historical analysis to dental economics. They should not exceed 3000 words and 30 references. A reasonable number of tables and illustrations will be accepted.

4. **Short reports** - These include reports on current topics, modified techniques, new materials, practice management etc. Interesting results from routine, clinical work or laboratory investigations also may be accepted.

5. **Case reports** - Reports such as of rare diseases or conditions. Modifications to accepted treatment procedures, new management methods etc. may be included in this category.

6. **Letters to Editors** - Subjects unlimited, but may include short critique of published papers in the SLDJ.

7. **Miscellaneous topics** - Subjects unlimited and the format are free. These may also include details of scientific meetings, conferences, annual sessions, examinations, news and views, visits and obituaries.

8. **Proceedings of annual sessions** - Abstracts from annual sessions of the SLDA and other colleges will be published under this category.

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Authors submitting a paper do so on the Understanding that no part has been published before, that it is not being considered for publication elsewhere and that it has been read and approved by all the authors.

Manuscripts including Tables and Figures should be sent in triplicate as the work will be reviewed by two or more referees. While papers are subject to editing. The journal does not hold it responsible for statements made by the contributor. The author alone is responsible for the statements made in his paper.

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The manuscripts should be typed, double-spaced: on A4 (210x297 mm) paper and submitted in correct English: both English and American spelling are acceptable, provided this is consistent throughout the manuscript. Manuscripts not submitted in proper format or in poor English may be returned without review. The format of a manuscript should be as

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