



The Canadian Forces
Dental Services
Bulletin

Number 2, December 1982

Brigadier - General
James N. Wright

New Director
General
Dental Services





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IN THIS ISSUE

1. New Director General of Dental Services
2. Hyperbaric Oxygen Therapy in Oral Surgery
6. Diving as Related to Dentistry
8. Endodontic Case Report — Obturation of a Pupless Tooth with a Calcified Apex, Secondary to Trauma
10. Radiation Hazards in Dentistry
13. In Memoriam
14. Eye Protection in the Dental Office
16. CFDS News
20. DGDS Retirement Mess Dinner
20. Other Ranks Honour BGen W.R. Thompson

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New Director General of Dental Services

On the 25th June 1982 Brigadier-General James N. Wright assumed the appointment of Director General of Dental Services for the Canadian Forces. He brings to the position an extensive and diverse academic, professional and military background.

The new Director General, who was born in Lethbridge, Alberta, began his military career in 1953 when he enrolled in the Regular Officer Training Program at the University of Alberta. After obtaining his Doctor of Dental Surgery Degree in 1956, he came to full time military service. He is a certified specialist in periodontics, holds a Masters of Science in Oral Pathology and is a graduate of the National Defence College.

His military service experience includes: tours of duty with the Navy at sea aboard HMCS Ontario; with the Army in Germany; with the Airforce at Namao, Comox, Clinton and Cold Lake; and with the United Nations as Senior Dental Advisor to the United Nations Emergency Force in Egypt. His two tours at National Defence Headquarters have included appointments as Special Projects Officer in the Dental Division and as Director of Dental Treatment Services.

General Wright has had a great deal to do with the advancement of professional standards in the CFDS. During his three tours at the Canadian Forces Dental Service School he has served as: course director for

dental assistant and hygienist training; instructor in endodontics; head of the department of periodontics; and ultimately as the Commandant of the Dental School. He also was seconded for a one-year period in 1969-70 as the chief instructor on a retraining program for Czechoslovakian dentists conducted at the University of Western Ontario. He has published a number of professional articles and lectured on endodontics, periodontics and oral pathology to local dental societies as well as provincial, national and international meetings.

He holds a number of "firsts" in the Dental Services. In 1964 he was the first Canadian Officer to attend the one year Advanced Theory and Science of Dental Practice post graduate course at the United States Army Institute of Dental Research, graduating with the course gold medal. His outstanding marks which stand as a record to this day for both Canadian and American attendees did much to ensure continued attendance of Canadian Officers on the course and pave the way for specialty training with the US Forces. He was the first periodontist trained in the Canadian Forces and together with his predecessor, BGen W.R. Thompson, an oral surgeon, was one of the two first clinical specialists certified in the Canadian Forces Dental Services. His periodontics specialty training was taken at Walter Reed Army Medical Centre and Georgetown University in Washington, D.C., while his degree in Oral Path-

ology is from the University of Toronto. His attendance in 1980-81 at the National Defence College made him the first dental officer to attend the course in its 35 year history.

General Wright is well known in the civilian dental community through his involvement as a member of the House of Delegates of the Association of Canadian Faculties of Dentistry, representative to the Council on Education of the Canadian Dental Association, representative to the Provincial Dental Secretaries Conference, representative to the newly formed Conference of Provincial Licensing Bodies, member of CDA Council on Education Accreditation Survey Team for post graduate studies and presently as a Governor on the Board of Governors of the Canadian Dental Association. Civic involvement has included a two-year term as a director on the Greater Barrie and District Chamber of Commerce.

General Wright's contributions to dentistry were recognized in 1977 when a Fellowship in the International College of Dentists was conferred upon him and in 1980 when he was appointed Honorary Dental Surgeon to Queen Elizabeth II.

Brigadier-General Wright and his charming wife Elaine, have three daughters. Michele and Lisa reside with them in Ottawa, while Tammy is entering third year at the University of Guelph.



Hyperbaric Oxygen

*LCol E.L. Macinnis, CD, DDS, FRCD(C)**

Hyperbaric medicine is principally concerned with the physiology and therapeutic applications of oxygen applied at pressures greater than one atmosphere absolute. In practical terms this simply means intermittent, short term, high dose oxygen inhalation therapy. Generally, the oxygen is administered by face mask, or endotracheal tube, in a recompression chamber.

Differentiation between hyperbaric oxygen as the primary mode of therapy, or as one facet of multicomponent therapy, is a crucial concept if you are to employ the modality successfully. This is particularly important in oral surgery, where it cannot be over-emphasized that hyperbaric oxygen is only one additional factor. Sound surgical principles must be adhered to and accepted techniques employed. The recently circulated paper by Branham & Triplett must be viewed in this light.¹ Their research protocol is extremely sound² but otherwise they violate every basic surgical tenet. Osteomyelitis in rabbits, or humans, cannot be successfully treated without reduction and fixation of fractures, incision and drainage, sequestrectomy, debridement, saucerization and appropriate antibiotic therapy.

HISTORICAL REVIEW:

In 1662 Henshaw built the first recompression/decompression chamber for therapeutic use. This precedes Priestly's discovery of oxygen by 100 years and the 1841 use of compressed air for Caisson construction by 180 years³.

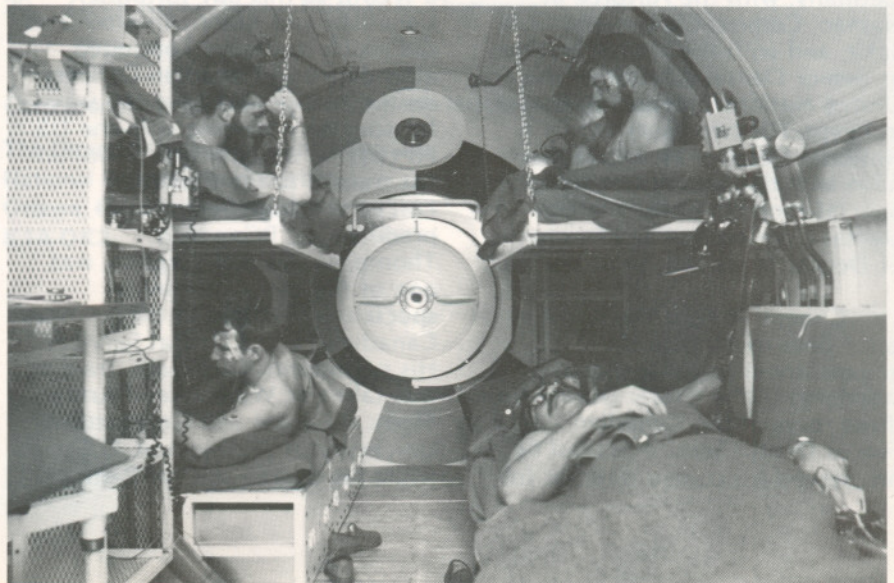
Subsequent utilization of therapeutic chambers parallel closely the advances made in treatment of decompression sickness (bends)⁴. Both in Caisson work, and in military diving, advances were achieved. However, the military contribution appears greater⁵.

In 1860 the first therapeutic hyperbaric chamber in North America was built in Canada. In the 1920's Dr. Orval Cunningham began experiments utilizing elevated partial pressures of oxygen in compressed air to treat hypoxia⁶. Unfortunately, application of the

hyperbaric oxygen to inappropriate diseases brought discredit to him and the modality.

The military and civilian studies undertaken during the 1930's of oxygen breathing at high pressure provided the baseline for oxygen tolerance limits. Continuing studies of oxygen toxicity brings us to the present era of hyperbaric oxygen therapy⁷.

In 1960 the first publications^{8,9,10} appeared on the use of physically dissolved oxygen to support life in the absence of hemoglobin and the use of hyperbaric oxygen in the treatment of clostridial infections. Subsequent work has now established hyperbaric oxygen as the treatment of choice in the treatment of decompression sickness, gas embolism, gas gangrene and carbon monoxide poisoning. In addition, the use of hyperbaric oxygen as an adjunct



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Therapy in Oral Surgery

to surgical and medical management of chronic osteomyelitis, osteoradionecrosis, soft tissue radio-necrosis, bone and skin graft healing enhancement, and burn therapy is standard practice in many centers.¹¹

MECHANISM OF ACTION

It is not within the scope of this paper to delve into the physics and physiology of oxygen under pressure. This subject is adequately covered in many good physics textbooks, the U.S. Navy Diving Manual and the Davis & Hunt textbook on Hyperbaric Oxygen therapy.¹²

Briefly, I want to outline methods of oxygen transport and utilization. One gram of hemoglobin can combine with 1.34 ml of oxygen. The normal concentration of hemoglobin is about 15 grams per 100 ml of blood.¹³ When hemoglobin is 100% saturated 100 ml of blood can transport 20.1 vol of oxygen attached to hemoglobin, this is 20.1 volumes percent. One hundred percent hemoglobin saturation is obtained at an arterial (PO_2) of between 100 and 200 mm of mercury. At normal barometric pressure only minimal amounts of oxygen are dissolved in the plasma. However, under conditions of hyperbaric pressure it is possible to dissolve 6 volumes percent of oxygen in the plasma.¹⁴ This concentration is sufficient to sustain life and is why hyperbaric oxygen is so successful in treating Carbon Monoxide poisoning victims.

OXYGEN TOXICITY:

The major complication of clinical importance in hyperbaric oxygen therapy is oxygen toxicity. The proper use of oxygen as a therapeutic tool requires adherence to a path between two extremes. One extreme is ignorance of oxygen poisoning and the subsequent administration of too much oxygen. The other extreme is excessive fear of oxygen toxicity and administration of insufficient oxygen to be of benefit. The toxic effects of oxygen can be manifested in the tracheo-bronchial tree, the CNS, the eye, erythrocyte hemolysis, liver and myocardial damage. Generally in hyperbaric medicine today as practised in most centers the first manifestation of oxygen toxicity is in the CNS. This is generally a grand mal type of seizure which may be preceded by nausea. We have one documented case of CNS involvement at this institution and FDU(A) treating a case of mandibular osteomyelitis. The U.S. Air Force in their huge series of cases at Wilford Hall have had four documented cases, all CNS involvement.¹⁵

MICROBE RESPONSE TO HYPERBARIC OXYGEN:

The general aim of hyperbaric oxygen therapy is to damage the microbe without long-lasting damage to the host. In both microbes and humans oxygen toxicity is time pressure dependent. Dose response versus time is critical. The goal is exposure to a given PO_2 long enough to affect micro-

bial physiology adversely, thereby giving the hosts defence mechanisms an opportunity to prevail, but not long enough to cause toxicity in the host.¹⁶

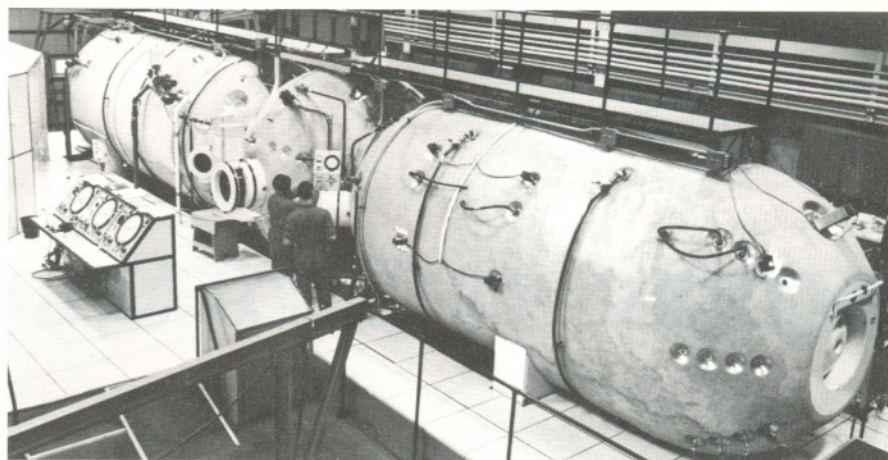
Oxygen is not selective as an anti-microbial agent. It inhibits gram positive and gram negative bacteria with equal facility acting as a broad spectrum drug. There is increasing evidence that the point of attack on the micro-organism is the PABA — folic acid pathway.¹⁷ This may also enhance the action of sulfonamides and other drugs.

HOST DEFENCE MECHANISM:

Ingestion and killing of bacteria by phagocytic leukocytes comprises a major element of the host anti-bacterial defence. This requires the integrated function of humoral immune globulins, complement and phagocytes. Intraleucocyte killing can be accomplished by a variety of mechanisms, and the particular mechanism utilized depends in part on the bacterial species that is ingested.

One of the major anti-microbial mechanisms of the leucocyte utilizes H_2O_2 , Super Oxide and possibly other reduced oxygen moieties, derived from molecular O_2 , in the killing of micro-organisms¹⁸.

Effective function of the latter system requires an intact leucocyte oxidase system, a supply of oxygen, and in some cases the presence of myeloperoxidases in the leucocyte granule. Deficiency of either leucocyte oxidase or



oxygen causes a defect in leucocyte killing that is identical in vitro. These deficiencies produce a situation closely resembling the CGD (Chronic Granulomatous disease) syndrome.¹⁹

This concept is supported by in vitro studies of experimental wound infection in animals in which hypoxia retarded bacterial killing and increased the incidence of established wound infection, and normobaric hyperoxia provided protection from wound infection by increasing bacterial killing rates.²⁰

Delivery of oxygen to an area of bacterial invasion is one essential requisite for effective leucocyte killing of certain common bacterial pathogens. However, the exact tissue oxygen tension required for optimal in vivo killing has not been rigorously established. However, it may be of considerable significance in treating infections in hypoxic tissues by organisms that are killed either by oxygen, or oxygen-dependent mechanisms in leucocytes. Thus in hypoxic tissue infections hyperbaric oxygen may be of significant therapeutic benefit.²¹

ROLE OF OXYGEN IN WOUND HEALING:

A complete discussion of the experimental data available on this subject is not within the scope of this paper. For an excellent review of this material, I refer you to Davis & Hunt, Chapter 9. In short summary hyperbaric oxygen seems to have little role in healing clean, normal, incised wounds. Its role in hypoxic wound healing, however, appears to be well established.²²

This is the theoretical basis of its application in treatment of osteomyelitis and osteoradionecrosis — the most common uses of this modality in oral surgery.

CURRENT USES OF HYPERBARIC OXYGEN IN ORAL-MAXILLO-FACIAL SURGERY:

There is little doubt that the clinical applications of hyperbaric oxygen are useful in conditions such as osteomyelitis and osteoradionecrosis. This has wide spread clinical support from our own institution as well as literature back up.^{23,24,25,26} Both these conditions involve ischemic bone on tissue hypoxia. Bone infection persists and osteogenesis is retarded until vascularity of the infected area can catch up with cellularity. These two factors are probably the major reason that hyperbaric oxygen is a successful adjunct in the treatment of osteomyelitis and osteoradionecrosis along with the more traditional measures of antibiotic therapy, incision and drainage, sequestrectomy and saucerization.

CLINICAL USES AT CFHH:

Since October 1977 we have treated eleven cases of acute, subacute and chronic osteomyelitis at CFHH and the Chamber at FDU(A). All cases had aggressive antibiotic therapy, surgical debridement and I and D as indicated plus 30-40 treatments with hyperbaric oxygen. The O₂ is administered at 2.4 ATA for 90-120 minutes per session. Utilizing this regimen we have not had a treatment failure or recurrence to date that we are aware of.

In addition the patients who were suffering from pain were universally pain free after three to four treatments. It is also our clinical impression that purulence did not last beyond seven days.

The only complication to date has been an O₂ hit on the 23rd treatment of one patient with mandibular osteomyelitis, no adverse sequelae resulted from this and the patient's osteomyelitis is in the arrested stage at the present time.

In addition we have placed five patients who were undergoing bone grafting to the maxilla or mandible in the chamber for 10-12 treatments. We justified this on the theoretical grounds that hyperbaric oxygen should enhance uptake of the graft. However, it must be noted that we cannot prove the grafts would not have taken without the hyperbaric oxygen therapy.

One of the treatment in this bone graft series was aborted after the third dive because of patient inability to clear her ears. She eventually sloughed a small bony sequestra but the majority of her graft did take.

SUMMARY

An overview of the historical development of hyperbaric medicine as it is practised today has been given. In addition some of the more salient points of hyperbaric oxygen therapy have been presented. Our clinical experience at CFHH has been summarized. The conclusion we have drawn is that hyperbaric oxygen therapy is a valuable clinical adjunct in treating osteomyelitis of the mandible. In

addition it may have some validity in enhancing the uptake of bone grafts in the maxilla and mandible.

REFERENCES

1. Branham, G.B., Triplett, R.G. *Hyperbaric Oxygen Therapy for the Treatment of Mandibular Osteomyelitis in Rabbits*. FDI, Working Group on Deep Water Submergence Dentistry. Annual report 30 August, 1980
2. Christensen, L.B. *Experimental Methodology*. Allyn and Bacon, Inc., Boston. 1977
3. Jacobson, J.H. 1, Marsch, J.H.C., Randall-Baker, L. *The Historical Perspective of Hyperbaric Therapy*. Ann. N.Y. Acad. 117: 651-670, 1965
4. *Lecture Notes: SDMO Course 1980. DCIEM*
5. *Lecture Notes: SDMO Course 1980. DCIEM*
6. Cunningham, O.J. *Oxygen Therapy by Means of Compressed Air*. Anesthes. Analg. 6:64, 1927.
7. Davis, J.C., Hunt, T.K., *Hyperbaric Oxygen Therapy*. Ch 6. pp 61-71. Undersea Medical Society. Bethesda. 1977.
8. Boerema, I. *Operating Room with High Atmospheric Pressure*. Surgery 49: 291-298, 1961.
9. Boerema, I. Brummelkamp, W.H. *Behandling van anaerobe infecties met inademing van zuurstof onder een druk van drie atmosferen*. Ned. Tijdsch Geneesk 104: 2549, 1960.
10. Boerema, I. Meijne, N.G., Brummelkamp, S. Brownia, M.H., Mensch, F. Kamermans, M. et al. *Life without Blood: A study of the influence of high atmospheric pressure and hypothermia on the dilution of blood*. J. Cardiovasc. Surg. 1:133, 1960.
11. Davis, J.C., Hunt, T.K., *Hyperbaric Oxygen Therapy*. Ch 1. pp 3-9. Undersea Medical Society. Bethesda. 1977
12. Davis, J.C., Hunt, T.K., *Hyperbaric Oxygen Therapy* Cha 2. pp 11-24. Undersea Medical Society, Bethesda. 1977.
13. Cuyton, A.C. *Textbook of Medical Physiology*. W.B. Saunders Coy. Philadelphia. 1971.
14. Davis, J.C., Hunt, T.K., *Hyperbaric Oxygen Therapy*. Chap 2 pr 20. Undersea Medical Society. Bethesda. 1977.
15. Heimback Personal — Communication
16. Davis, J.C., Hunt, T.K., *Hyperbaric Oxygen Therapy*. Chap 7 p. 80. Undersea Medical Society. Bethesda. 1977
17. Gottlieb, S.F. Solosky, J.A., Aubrey, R., Nedelkoff, D.D. *Synergistic action of Increased Oxygen Tensions and PABA — Folic Acid Antagonists on Bacterial Growth*. Aerosp. Med. 45: 829-833. 194.
18. Davis, J.C., Hunt, T.K., *Hyperbaric Oxygen Therapy*. Ch 8 p. 198, Undersea Medical Society. Bethesda. 1977
19. Davis J.C., Hunt, T.K., *Hyperbaric Oxygen Therapy*. Ch 8 p. 108. Undersea Medical Society. Bethesda. 1977
20. Hunt, T.K., Tinsey, M., Grislis, G., Sonne, M. Jawetz, E. *The Effect of Different Ambient Oxygen Tensions on Wound Infection*. Ann. Surg. 181:5, 1975
21. Davis, J.C., Hunt, T.K., *Hyperbaric Oxygen Therapy*. Ch 8. p. 108. Undersea Medical Society, Bethesda, 1977
22. Davis, J.C., Hunt, T.K., *Hyperbaric Oxygen Therapy*. Ch 9. p. 118 Undersea Medical Society. Bethesda. 1977
23. Manious, E.C. *A Study of Osteomyelitis Following Tooth Extraction*. U.S. Navy Med. J. 61:32, 1973
24. Manious, E.G. Boyne, P.J., Hart, G.B. *Elimination of Sequestrum and Healing of Osteoradionecrosis of the Mandible after Hyperbaric Oxygen Therapy: Report of a case*. J. Oral Surg. 31: 336-339, 1975.
25. Manious, E.G., Boyne, P.J., Hart, G.B., *Hyperbaric Oxygen Treatment of Mandibular Osteomyelitis: Report of three cases*. AM. Dent. Assoc. 87-1426-1430, 1973
26. Manious, E.G., Boyne, P.J., Hart, G.B., Terry, B.C. *Restoration of Resected Mandible by Grafting with Combination of Mandible Homograft and Autogenous Iliac Marrow, and Post Operative Treatment with Hyperbaric Oxygenation*. Oral Surg. 35: 13-20, 1973



DIVING AS RELATED TO DENTISTRY

Major J.G. Grenier*

INTRODUCTION

Dental problems encountered during diving procedures are directly related to changes in gas pressure. A variety of terms are used to describe dental pain associated with diving. The more popular ones are: Dental Barotrauma^{1,8}, Baric Odontalgia², Aerodontalgia⁷ or Tooth Squeeze⁴. In diving barotrauma occurs when the gas pressure in any body space fails to match the changing ambient pressure.

REVIEW OF THE LITERATURE

Baric odontalgia is infrequent (1.5% of the subjects)² and can be classified under four major categories:

1. Compression or decompression of gas bubbles in an infected tooth^{1,2,3,8};
2. Implosion (collapse) or explosion of a tooth or part of it^{1,2,8};
3. Tracking of gas into tissues^{1,6};
4. Occlusion of maxillary sinus openings^{4,7}.

Gas spaces may exist at the apex of an infected root or around fillings which have undergone secondary erosion¹. During descent the spaces can fill with soft tissue or blood^{1,3} if there is no communication with the oral cavity. Pain can then be very severe and may

prevent further descent^{1,2}. Even if no symptoms are noticed on descent, gas expansion may induce pain on ascent if there is no communication with the oral cavity^{1,2}.

A tooth with a cavity bordered by thin cementum may implode on descent or explode on ascent as pressure differences develop on each side of the cementum, causing again considerable pain^{1,8}. A fast rate of descent or ascent can also precipitate this problem^{1,8}. When a devitalized tooth is improperly filled, the sudden expansion of gas during rapid ascent can cause the tooth to burst into fragments². This incident in most cases does not cause any pain and the loose fragments in the mouth are the only tell tales.

Gas can find its way into the tissues through interruptions in the oral mucosa after surgical procedures, extractions, accidental trauma¹, etc. In these cases, the positive oral pressure produced by scuba regulators can force gases into the tissues. So it is important that complete tissue resolution occur, i.e. the mucosal surface be intact, before diving can resume^{1,6}. A case of recurrent severe facial emphysema has been reported⁶ involving the right side of the face of a submariner. The swelling was most pronounced 15 hours after deep submersion and disap-

* Major Grenier graduated from Université Laval in 1976. While on attached posting to HMCS Protecteur on the Atlantic coast he completed the Ship's Diving Officer Course. He is presently completing post graduate training in Periodontics at the University of Toronto.

peared four to five days after the submariner remained on the surface. The oral exposure of the palatal root canal of a maxillary bicuspid was found to be the culprit and the tooth was extracted. After "air tight" healing of the oral mucosa, air could no longer be trapped in the tissues and the patient returned to duty aboard the submarine without further complications.

When sporadic or constant pain occurs in the upper bicuspid and molar areas and cannot be localized to one tooth, one must not overlook the possibility of referred pain from the maxillary sinus. The pain is usually caused by the occlusion of the nasal openings which prevents gas pressure equalization^{1,4,7}. A study⁷ of 45 aerodontalgia cases occurring under hyperbaric conditions was conducted in the U.S. Navy. It was found that in the majority of cases pain was produced by increased pressure in the maxillary sinus and the area most often involved was the maxillary posterior segments with filled teeth present. The pain was usually sharp and occurred most often during descent and in 80% of cases the patient was also suffering from the common cold. The role of other causative factors was not elaborated on in this study.

This brief review of the literature emphasizes the import-

ance of dental fitness (red code) for our military divers. Dental officers must be aware of the potential dental problems likely to affect those exposed to hyperbaric conditions.

BIBLIOGRAPHY

1. Edmonds C., Lowry C., Pennefather J., *Diving and Subaquatic Medicine*. A Diving Medical Centre Publication, Mosman, Australia, 1976, pg. 90-91
2. Albano G., *Principles and Observations on the Physiology of the Scuba Diver*, Office of Naval Research, Arlington, Virginia, 1970, pg 15
3. Miles S. and MacKay D.E., *Underwater Medicine*, Adlard Coles Ltd., London 1976, pg 78 and pg 233.
4. Dueker C.W., *Medical Aspects of Sport Diving*, A.S. Barnes and Co., New York, 1970, pg 71-72
5. Bennett P.B. and Elliott D.H., *The Physiology and Medicine of Diving*, Bailliere-Tindall, London, 1975, pg 463
6. Verunac J.J., *Recurrent Severe Facial Emphysema in a Submarine*, JADA Vol 87, Nov 1973, pg 1192-1194, *Journal of American Dental Association*
7. Shiller W.R., *Aerodontalgia Under Hyperbaric Conditions — Oral Surgery, Oral Medicine and Oral Pathology*, Mosby, Vol 20, No. 5, Nov 1965, pg 694-697.
8. Edmonds C., and Thomas R.L., *Medical Aspect of Diving*, *The Medical Journal of Australia*, Vol 2., No. 23, 2 Dec 1972, Pg. 1300-1304.





Endodontic Case Report — Obturation of a Pulpless Tooth with a Calcified Apex, Secondary to Trauma

INTRODUCTION

Teeth with unusual root conditions, requiring variation in the conventional treatment procedures, are common when one is confronted with endodontic therapy for children. A prevalent problem is an open apex with a "blunderbuss" configuration to the canal. This means that the canal is wider towards the apex than it is nearer the cervical area, making it just about impossible to seal and thereby, achieve endodontic success.

For many years it was felt that apical root development could not be completed if the pulp was necrotic, and that the only way to provide an apical seal was through a surgical approach. More recently the procedure of choice is one referred to as "apexification",¹ which attempts to induce apical development using a calcium hydroxide paste.

With the apexification procedure, it is hoped that the canal and apex will continue to develop to a normal configuration, or that a calcified barrier will be formed at or near the apex to provide a definite stop. The latter event appeared to occur spontaneously, secondary to trauma, with the following case:

CASE REPORT

A 12 year old, well nourished, well developed caucasian girl was referred for treatment to the Endodontic Department at Fort Hood, Texas, while the author was on the endo rotation of a General

Dentistry Residency Program.

Chief Complaint

Periodic swelling and drainage in the area of the apex of tooth No. 22.

Medical History:

Noncontributory

Past Dental History:

Traumatic facial injuries occurred at age 9 as a result of a bicycle accident. At that time, tooth 21 was completely avulsed. However, no dental treatment was rendered.

Examination:

A sinus tract was present on the labial alveolar mucosa in the approximate vicinity of the apex of tooth No. 22. This tooth was sensitive to percussion and non-responsive to thermal and electrical pulp testing. The patient was in no distress.

Radiographs revealed a diffused radiolucency at the apex of tooth No. 22. The canal was fairly wide and there was what appeared to be a calcified bridge at the apex.

TREATMENT:

1st Appointment

Access was established and the working length was calculated and confirmed radiographically with a file in the canal. A definite apical stop could be felt clinically (Photo No. 1). The canal was cleansed and shaped with a No. 140 reamer and the wall preparation was completed with a No. 100 Hedstrom file. The canal was irrigated with saline and the access closed with a dry cotton pellet and ZOE.

2nd Appointment

The canal was reopened, irrigated with saline and a gutta-percha cone fitted. Due to the large size of the canal, it was necessary to make a customized cone. This cone was fabricated by taking several large gutta-percha cones, heating gently, and twisting them together. The twisted cones were then rolled between two



* LCol Foley is a graduate of Dalhousie University 1965. He completed a two year General Dentistry Program at Darnall Army Hospital, Fort Hood, Texas (1974-1976). He is presently the B Dent O at CFB Trenton.

glass slabs to make a homogenous mass. By applying slightly more pressure on one side of the moving slab, a tapered gutta-percha cone was obtained. The warm cone was then sprayed with ethylchloride, which quickly turned it to a rigid state. The cone was then placed in the canal to the working length and a radiograph was taken (Photo No. 2).

At this point, it was noted that the apical one third of the canal was of a blunderbuss configuration and as a result, even though the gutta-percha point reached the apical stop and demonstrated "tug-back", there was a void in the apical area (Photo No. 2). It was felt that routine lateral condensation would not completely obturate the apical area and that an alternative technique would be required.

3rd Appointment

After consultation and re-evaluation of the radiographic appearance, the following procedure was carried out under the guidance of the Chief Endodontist.*

1. The tip of the master cone was softened by placing it in chloroform for a few seconds.
2. The master cone was inserted into the canal under pressure. Those procedures were repeated several times, with the result that the master cone began to assume the internal shape of the apical one third of the canal.
3. A new radiograph revealed that the void in the apical area was reduced, however, a deficiency still existed.



4. Chloropercha was made by placing small segments of gutta-percha in a container of chloroform and periodically mixing until a creamy consistency was obtained.
5. The master cone was coated with Proco-Sol root canal sealer and a dab of chloropercha was placed on the apical end.
6. The cone was placed in the canal under pressure and a No. 3 plugger was inserted in the mesial aspect of the canal with both lateral and vertical pressure. The plugger was rotated and removed and a No. 15 gutta-percha cone was inserted and condensed with the No. 3 plugger. This procedure was repeated several times and a recheck radiograph revealed that the apical area was completely obturated and that the sealer and the gutta-percha had been forced laterally in a "T" formation. (Photo No. 3)
7. It was concluded that the apical area was acceptably obturated and the lateral condensation continued until the entire canal was filled. An adaptic restoration was placed to seal the access opening and the patient was re-appointed for follow-up observation.

DISCUSSION

It is felt that this case is of interest for two reasons:

1. The formation of a calcified bridge at the apex called "traumatic calcification" or "natural apexification".
2. The usual method used to obturate the canal.

It has been stated² that in order for apexogenesis (normal physiological root apex development) to occur, normal pulp tissue must be present in the apical portion of the root canal. This is thought to enable Hertwig's epithelial sheath to continue root formation. Yet, Michanowicz³ stated that it is possible for Hertwig's epithelial sheath to maintain its vitality at the apical end of the root when a sinus tract was present. In the case presented, the pulp was necrotic with a sinus tract and a definite cal-

cified bridge was observed. This would tend to confirm Michanowicz' observations. However, it is possible that the root formation and the calcified closure developed while some vital pulp tissue remained in the apical portion of the canal. The pulp may have remained vital for some time before becoming necrotic, since the trauma was sustained three years previous.

A study by Dylewski⁴ of the apical closure of non-vital teeth employing apexification procedures would indicate that repair may occur at the apical end of the tooth which is independent of Hertwig's epithelial root sheath. In this study, using monkeys, it was observed that instead of continuation of normal root development, a state of repair was observed at the apex. This was characterized by proliferation of connective tissue which differentiated into a calcified material, identified as osteodentine. The material at the root tips had the right location of dentine but tubules were not seen and the growth pattern was trabecular. Consequently, it appears that the nature of apical closure in immature pulpless teeth is still not clear regardless whether it develops on its own, as in the case described, or it is induced by apexification procedures.

It is also felt that this case is interesting from the point of view that a different and unusual method of obturation was employed. As was noted previously, the canal was of a blunderbuss configuration, even though there was an apical stop (Photo 1). Since the walls of canals appeared very thin in the apical area; removing the constriction would possibly result in root perforation. Possibly the "vertical condensation technique" would have been successful. This technique consists of selecting or constructing a master cone wider than the apical diameter. When it is placed in the canal, it will bind short of the apical portion of the preparation. The coronal portion of the master cone is seared off and a spreader is heated and applied to soften the cone. A cold plugger then forces the gutta percha into the wider part of the canal and the irregular-

(Cont'd. on page 10)



RADIATION HAZARDS IN DENTISTRY

Captain J.B. Dunstan*

When we refer to "radiation" in dentistry we really mean "ionizing radiation" which we specifically attribute to x-rays. It is the ability of x-rays to cause ionization that is responsible for their ability to produce such far reaching effects in biological material and controversy in dentistry.

There are two accepted theories regarding how radiation damages biological systems. They are the direct or "target" theory and the indirect or "poison water" theory. The direct theory proposes that some of the damage that occurs is the result of a direct

hit on an atom by an x-ray photon resulting in ionization of the specific atom. If this atom is a key one in a macromolecule chain impaired function or inactivation of the entire molecule could result which would affect other cell constituents (i.e. DNA enzymes, etc.). The indirect theory proposes that the effects of radiation are due to the ability of radiation to ionize water which composes approximately 80% of our body, producing hydrogen and hydroxyl ions. These free radicals recombine to form water for the most part, however some recombine to form oxidizing or reducing agents such as hydrogen peroxide which are very damaging to the cells. Most investigators now believe that the biological effects of radiation are due to a combination of these two theories.

Due to their ionizing effects, x-rays have the potential for damaging healthy cells and tissues. Although not all interactions are harmful, some may

result in injury or death in a number of cells. The cell is most susceptible to radiation damage during mitosis. If radiation damage to the cell during this period does not kill the cell, the daughter cells resulting from the division may contain abnormalities that will be transmitted to all future cells deriving from these abnormal cells.

All cells are not equally sensitive to x-radiation. The Law of Bergonie and Tribondeau states that "the radiosensitivity of cells and tissues is directly proportional to their reproductive capacity and inversely proportional to their degree of differentiation." As a result actively dividing cells (i.e. tumor cells) are more sensitive than mature cells of the same tissue.

A list in order of decreasing relative sensitivity to radiation would be:

- (a) Lymphocytes
- (b) Erythroblasts

* A 1978 graduate of University of Alberta, Capt Dunstan was employed as Dental Officer at CFB Cold Lake from 1978 to 1980. He is presently in charge of the dental clinic at CFS Gander.

ENDODONTIC CASE REPORT —

(Continued from page 9)

ities that would not otherwise be filled. However, this technique can be quite difficult and time consuming. The procedure of obturation previously described appeared to work well in this particular case.

SUMMARY

1. A case has been presented of a patient with a pulpless tooth and a calcified bridge secondary to trauma.
2. It would appear from a brief review of the literature, that the mechanism of calcification of "apexification" of pulpless teeth is only speculative at this time.

3. Although methods of sealing a root canal may vary, it is felt that an unusual technique of obturation was employed in this case.

REFERENCES

1. *Weine, Franklin S. Endodontic therapy. C.V. Mosby Co. St. Louis, 1972*
2. *Grossman, Louis I. Endodontic practice. 8th ed. Lea & Fibiger, Philadelphia, 1974*
3. *Michanowicz, John P. & Andrew E. A conservative approach and procedure to fill an incompletely formed root*

using calcium hydroxide as an adjunct. J Dent Child. 42:47, Jan 1967

4. *Dylewski, John J. Aprical closure of non-vital teeth. O.S., O.M. & O.P. 32:1, 82-89, July, 1971.*

*ACKNOWLEDGEMENT

The case described was managed under the direction of Col Ralph Bellizzi, U.S. Army Dental Corp, Fort Hood, Texas. Col Bellizzi is presently Director of the Endodontic Residency Program at Madigan Army Medical Center, Tacoma, Washington.

- (c) Myeloblasts
- (d) Epithelial cells
- (e) Endothelial cells
- (f) Connective tissue cells
- (g) Tubular cells of the kidney
- (h) Bone cells
- (i) Nerve cells
- (j) Brain cells
- (k) Muscle cells

These positions are not fixed and may vary depending on the age of the tissue or the organism.

During a single radiographic examination the radiation exposure received by an individual is generally low, and thus only an insignificant number of cells are affected. The body will repair most of these damaged cells. However, because the repair is probably never complete a small amount of unrepaired damage remains. Each succeeding radiation injury adds a small amount to this increment of unrepaired damage which is known as the "accumulative effect" of radiation. The same situation exists for other agents, such as bacterial infections, viral diseases, trauma, etc. The sum total of this process is considered to be the basis for aging.

The amount of radiation injury depends on several factors, which include:

- (a) The total absorbed dose
- (b) Dose rate
- (c) Specific area involved
- (d) Relative radio-sensitivity
- (e) Age
- (f) Variation in response between species and individuals.

When an organism is exposed to a dose of radiation certain effects may occur depending on the dose. Exposure to a dose of radiation is usually followed by a latent period between the radiation exposure and the appearance of effects. They may be a very short time (hours, days, weeks) or it may be a very long time

(years, decades). The appearance of effects following radiation exposure is related to the amount of radiation delivered and the time it is delivered in.

If a very large dose of radiation is delivered in a very short period of time, the latent period will be short. If the dose is large enough, the effects comprise a collection of signs and symptoms known as acute radiation syndrome. This occurs as a result of large doses of radiation, generally over 100 rads, delivered to all or a major portion of the body. The total effect may vary from mild transient illness to death. The acute radiation syndrome is not a problem in dentistry.

Long term effects manifest themselves years after the original exposure or they may be due to a previous exposure that the individual has survived or from chronic low level exposures delivered over a long period of time. It should be noted that diagnostic radiography fulfills the description for chronic low levels of exposure, especially when it is repeated on a frequent basis. The probabilities of long term effects on the large number of people who receive low level, repeated exposures is cause for greater concern that the short term radiation effects from acute exposures that involve only a few individuals.

The long term effects are considered to be carcinogenesis, embryologic effects, cataract formation, life-span shortening and genetic effects.

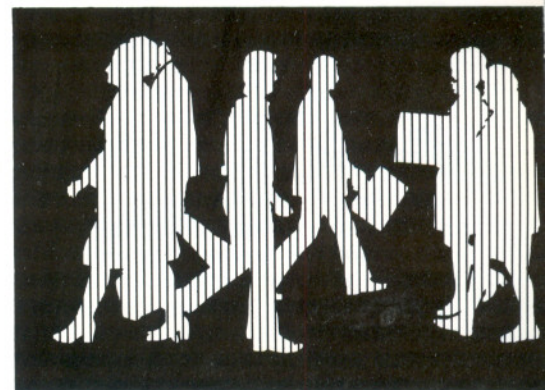
Ionizing radiations and x-radiation specifically have been shown to exert an almost universal carcinogenic action that results in neoplasms. Current belief is that many diseases and malignancies are caused by the simultaneous interaction of several factors and that the presence of some without others may not be sufficient to induce the disease. Therefore, x-radiation being only one of a number of possible carcinogens involved, to decrease the incidence of neoplasms we should decrease

the amount of exposure to the patient which would therefore decrease the chances of a simultaneous interaction of factors.

Fetal tissues composed of immature, undifferentiated and rapidly dividing cells are highly sensitive to radiation. The principal hazard to the fetus occurs during the period of major organogenesis or within the first trimester. Changes as a result of radiation may be expressed as birth abnormalities, stunting of growth, increased incidence of mental retardation, and intra-uterine death. A study of exposures of women indicates that the contribution to the ovaries or uterus from dental radiographic examination is of the magnitude of .03 - 0.1 millirads per exam and that if a leaded apron is used the potential exposure is essentially reduced to zero.

Diagnostic dental x-rays have not been directly associated with cataract formation but we should however take care to minimize x-ray exposure to the eye from our procedure as much as possible.

X-radiation is known to be capable of causing mutations that can be passed from one generation to another. Mutations can also be caused by elevated body temperatures, certain drugs, and exposure to other chemical agents. We must also realize that we live in a sea of low level background radiation. Every day we receive exposure that averages .3 mR per day of whole body radiation. Geneticists talk of a



doubling dose (dose radiation to all population which would double the rate of genetic mutations from the naturally occurring rate) as being 50 rads over a lifetime full body exposure. The dental contribution to the genetic hazard is extremely small, probably ranging from 0.0 to 0.2 mR per dental exam. However, we should assume that the mutation rate is directly proportional to the exposure thus we should decrease the exposure to the minimum to obtain necessary diagnostic information and use a lead apron for all patients.

We can see therefore that there exists a potentially serious hazard involving radiation. However, if common sense and proper procedures are followed the hazard to the patient and the staff is minimal. There are no absolute standards for the amount of x-rays that can be safely administered to an individual, therefore it is important that the dose of x-rays be kept to the minimum that will provide adequate diagnostic information.

Every province has some sort of legislation concerning x-ray emitting devices. There are varying standards for exposure levels, monitoring, installation, and operation of equipment. In addition, the Federal Government under its Radiation Emitting and Devices Act, Regulation 721 of the Public Health Act, includes standards of construction and functioning as well as inclusion of certain mandatory features of any such machine.

Some common specifications for the amount of lead lining in operatory walls required at varying distances from the x-ray source area (in millimeters):

| 1m | 2m | 3m | 4m | 5m |
|------|------|------|------|------|
| 0.40 | 0.25 | 0.15 | 0.10 | 0.10 |

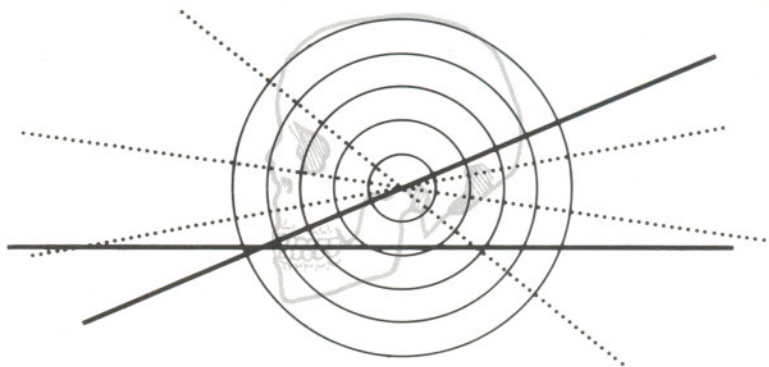
Practically $\frac{1}{32}$ inch (.794 mm) of lead (2lbs/sq. ft) is standard for dental offices because it is not economical to purchase it in thinner sheets.

The lead aprons should have a minimum lead equivalent

of at least 0.25 mm for x-rays up to 150 KVP.

Preventive measures to be used for patient and personnel protection are:

- (a) Question patient regarding recent x-ray exposure to head and neck — if large, wait minimum of three weeks.
- (b) Use fastest practicable film with proper exposure and developing technique to avoid retakes.
- (c) Use optimum kilovoltage — have machines maintained properly, tested (DENT Program), and calibrated properly (timers, etc).
- (d) Use leaded apron and/or leaded bib (to protect thyroid; bib cannot be used for panorex as it blocks out the lower border of the mandible).
- (e) Determine the minimum number of films that will produce the desired diagnostic information.
- (f) Use long cone paralleling technique — optimizes image and minimizes scatter radiation.
- (g) Staff should never stand in primary beam, or hold a film pack in the patient's mouth, or hold the tube housing during exposure.
- (h) Operator should be at least 10 feet from the source and should be at right angles to the primary beam or should stand behind a wall (brick or concrete) or a lead screen or leaded glass.
- (i) A check should be made on the effectiveness of safety precautions by the



radiation protection service available from the Department of National Health and Welfare (TLD's).

- (j) Proper staff education is the most important point — each member must understand what x-rays are — they must also know how to prevent the hazards — for their own good and also for the patient's.

The knowledge however, is not sufficient — it must be implemented properly and ultimately it is the dentist who is responsible for this. He must ensure that the proper techniques are used and that the staff and himself are kept up to date through continuing education.

BIBLIOGRAPHY

1. Alcox, R.W. *Biological Effects and Radiation Protection in the Dental Office*. Dent Cl. N. Am. Vol. 22, No. 3, July 1978
2. Elman, J. *Control of Radiation Hazard in the Dental Office*. J Academy of General Dentistry Nov.-Dec 1975
3. Regulla, D.F. and Wachsmann, F. *Radiation exposure of dentists*. Quintessence International No. 8 Aug. 1976.
4. Fireman, S.M. *X-ray examinations: routine or protocol*. Oral Health. Jul 1981
5. *Reports of Councils and Bureaus. Recommendations in radiographic practices-March 1978*. JADA, Vol 96, March 1978.
6. *Health and Welfare Canada. Oral Radiological Services. Dec. 1979.*

In Memoriam

Lieutenant-Colonel R.D. Carver, CD, DDS, DDPH.



It is with profound regret that the Editorial Board of the Bulletin announces the passing of Lieutenant-Colonel Roderick Donald Carver, CD, DDS, DDPH, who died in Cornwallis, Nova Scotia, on June 27, 1982.

Lieutenant-Colonel Carver joined the Canadian Armed Forces in September 1965 when he enrolled in the Dental Officer Training Plan. He obtained his Doctor of Dental Surgery degree from McGill University in Montreal. In 1979-80 he attended the University of Toronto on post-graduate training in dental public health and was awarded the gold medal for outstanding achievement. During his career, Lieutenant-Colonel Carver served as a dental officer in Halifax, Nova Scotia and in Ottawa where he was also employed as career manager. In 1980, when he was promoted to the rank of Lieutenant-Colonel, he assumed the responsibilities of Base Dental Officer at CFB Cornwallis, Nova Scotia, where he was practising his profession at the time of his death.

To all who have known him and have had the privilege of working with him, "Rod" was a person with a tremendous zest for life. He could never give less than one hundred percent, whether it was to his faith, to his profession, to sports, to the "Corps", to his friends and, above all, to his family. His confrères and friends can only be shocked and dismayed by his untimely death at such an early stage of an outstanding military career. His memory will long remain in the minds and hearts of all those associated with him in the Dental Services.

All members of the CFDS join in expressing their most sincere condolences to his wife and family.

Sergeant Norma Laybolt



It is with much sadness that the members of the Canadian Forces Dental Services heard of the tragedy that claimed the life of Sgt Norma Laybolt. She was fatally injured in a car accident on 9 April, 1982 on her way to visit her family.

Norma joined the Military Police Branch in May, 1974. She remustered to the 722 trade in June 1977. She served in Petawawa and Cornwallis. She will be remembered as an aggressive worker, a cordial and respected friend. Death struck when life was blooming. She had recently been promoted to Sergeant and was looking forward to her new posting.

All members of the CFDS join in expressing their most sincere condolences to her family and friends.



EYE PROTECTION I

Captain D.F. MacLean*

INTRODUCTION

A recent survey of North American dental schools shows that there is little emphasis on adequate eye protection for the dental operator or the patient.¹ Thus, it is likely that the use of safety glasses may even decline after graduation. Another survey has shown that "less than 10% of practising dentists in Australia routinely provide eye protection for their patients."² Assuming a similar neglect in the CFDS, an article encouraging the use of various types of eye protection for CFDS personnel and their patients is offered.

DISCUSSION

Safety glasses or prescription eyeglasses with shatter resistant lenses can help prevent eye injury or infection from: missiles projected by instrumentation; microbial laden aerosol from coolant spray or three-way syringe; debris scattered by an air blast; corrosive chemicals as used in etching procedures; and from sharp instruments or wires which are dropped or misdirected. Note how close the eyes are to the mouth.

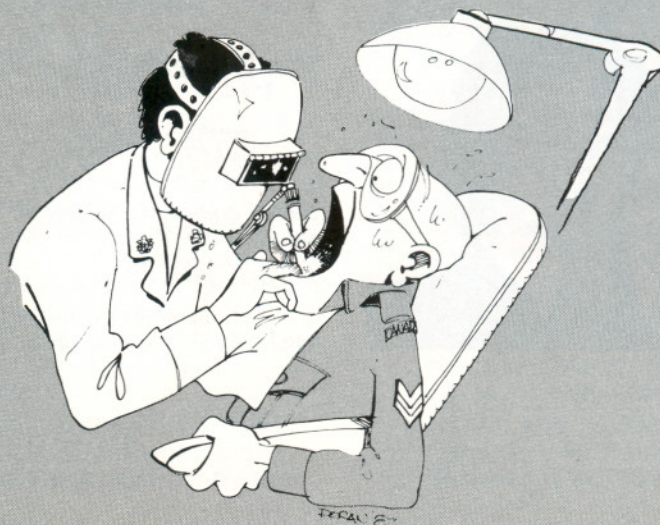
To show that eye injuries do occur, I quote, "An excellent article by Hales described ten cases of ocular injury occurring in private dental offices over a four-year period and treated in private ophthalmic practice. One of the cases was a penetrating injury of

the cornea and lens from a dropped excavator which caused permanently decreased vision and resulted in a law suit settled for \$27,000 in 1970 . . . Nine of the ten injuries could have been prevented by the patients wearing glasses. None of these patients was wearing glasses at the time of injury, and five had their own prescription glasses removed prior to treatment."³ Secondly, "In a recent survey of dentists by the American Dental Associations's Bureau of Economic Research and Statistics, 17 cases of contusions, infections, or foreign objects in the eyes were reported, with the loss of three eyes to the practitioners involved."⁴

Lab technicians are liable to eye damage from infrared and ultraviolet light radiation during casting and soldering procedures.⁵ Lab technicians should refer to this article published by Staffanou in the J. Pros. Dent. for details of the type of safety glasses required.

Oral surgeons are encouraged to wear safety glasses by Archer in his textbook of Oral Surgery, "the author personally knows of two dentists, each of whom lost the sight of an eye as the result of injury in one case and infection in the other . . . the need for protective eyeglasses with use of the air turbine is clearly demonstrated by the splash sprayed on the glasses."⁶

Eye protection for patients undergoing oral surgery is advocated by Bourne and White, "during many oral surgical procedures under general anaesthesia the middle and upper parts of the face are covered with surgical drapes. Because of the risk of corneal abrasion the eyes are usually protected by eye pads or by closing the eyelids with micro-pore or similar tape. Although these methods may eliminate the possibility of corneal rub there is still a real risk of penetrating eye injury from towel clips, sharp



* Captain MacLean obtained his DDS degree from McGill University in 1979. Upon graduation he was posted to CFB Greenwood where he is still presently employed.

THE DENTAL OFFICE

instruments, or wire."⁷ They describe the fabrication of a flat, 1.5 mm cellulose eye shield which can be used during general anaesthesia.

For CFDS personnel and patients who do not have their own glasses, many types of safety glasses and goggles are available through the CF supply system. An eyeglasses type with side mesh shields, NATO stock number 4240-21-879-6988, provides good protection, comfort, and good patient acceptance. Shop type goggles such as 4240-21-552-0525 provide better protection since the inferior border is tighter to the face, but patient acceptance has been poorer, they tend to fog, and leave a temporary red mark where they contact the face.

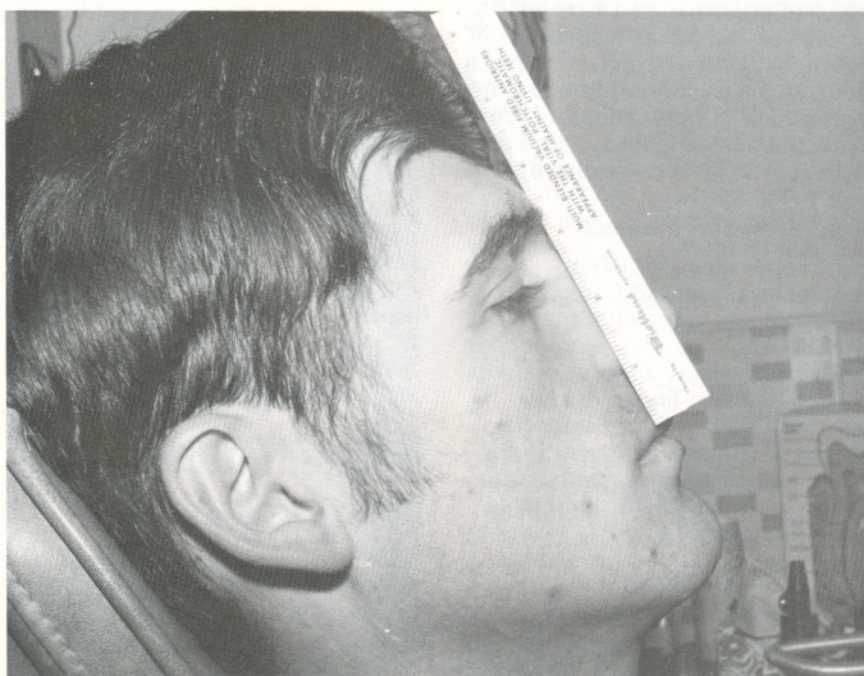
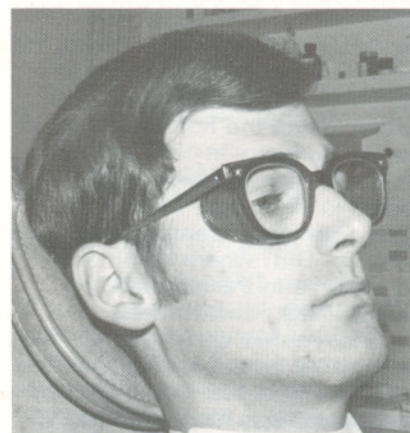
Most patients initially hesitate to accept safety glasses when offered, but later express appreciation of your concern for their well being.

CONCLUSION

We should try to increase the utilization of eye protection for CFDS personnel and patients, "even for routine examination,"⁸ to prevent eye injury, unnecessary grief, and lawsuits.

REFERENCES

1. Casey, E.P. and Casey, D.M. *Patient Eye Protection in the Dental Office*. NY State Dent J 45(9): 460, 1979.
2. *ibid.* 460
3. *ibid.* 460
4. Miller, J.B. *The Unseen Risk in Your Office*. Dent Manage 16(6): 38, 1976.
5. Staffanou, R.S. Drucker, C., and Middleton, C.W. *Eye Protection from Light Radiation*. J Pros Dent 35(6): 682, 1976.
6. Archer, W.H. *Oral and Maxillofacial Surgery*. Vol. 1, Ed. 5. p. 44. Saunders, Toronto, 1975.
7. Bourne, J. and White, P.R. *Eye Protection for Patients Undergoing Oral Surgery*. Br J Oral Surg 18(2): 136, 1980.
8. Robinson, J.M. *The Eyes Have It*. NZ Dent J 75(340): 115, 1979.



CFDS News

DIVISION

Farewell Dinner

During a dinner held at the National Press Club in Ottawa on 23 June 1982, members of the Division bid farewell to those of their members who are leaving for different reasons. LCol Bob Fortier takes his release, Maj Dan Fraser returns to the PAdm branch and Pte Debbie Askeland is transferred to another position at NDHQ.

After 20 years of service, LCol Bob Fortier leaves the CF to take residence in Sherbrooke, Que, where he will be practising periodontics in a clinic where 12 dentists are already established. He is the first periodontist to settle in the Eastern Township area. LCol Fortier joined the Forces in his first year of dentistry in 1962 and since his graduation in 1966, he has served in Winnipeg, Man; Lahr, West Germany; Trenton, Ont; Toronto, Ont. where he obtained his diploma in Periodontics; Halifax, N.S.; and Ottawa, Ontario. He has spent the last five years of his career at NDHQ in the Division where his most important assignment was his annual participation in the DOTP recruiting drive. LCol Fortier also bids us farewell as the editor of this Bulletin which has survived many a storm in the past few years and he wishes luck to his successor. We also want to wish him success and happiness in his new endeavours.

Promotion and Farewell

In early January BGen Thompson presented Capt Dan Fraser with an extra stripe to officially announce his promotion to Major, but that was not enough to convince Maj Fraser to stay with the CFDS. Major Fraser has elected to pursue his career in the PAdm branch and his formal association with the CFDS terminates in the summer of 82.

Maj Fraser joined the CF in 1962 and served as a dental assistant and hygienist until he was commissioned from the ranks

in 1970. After the DAO classification was incorporated with the PAdm branch in 1972 Maj Fraser served as A0 12 Dent Unit and as CADO in CFS Sydney. In 1979 he went to Dalhousie University under the UTPO program and obtained a BSc degree. He then returned to the CFDS cradle to fill the DDPR-3 position at the Division. At the time of writing Maj Fraser has just been selected for the one year french language training to start July 82. We are sorry to see Maj Fraser leave us and we hope that he will keep in touch; we certainly do not want to lose our Royal Cape Breton Air Force (RCBAF) connection.

Two Promotions at once

BGen Thompson is shown presenting WO Don Langford, DDTS 4-2 with, yes, two promotions. WO Langford was promoted to Master Warrant Officer on 28 Jan. 82, and 4 days later, on 1 Feb 82, he was commissioned from the ranks and promoted to Captain. After 23 years of service, mostly as a dental assistant, Capt Langford becomes a Dental Associate Officer and will fill the DDPR-4 position at the Division.

11 Dental Unit

Victoria and District Dental Society

11 Dental Unit and Victoria and District Dental Society co-sponsored a continuing education day 12 Feb 82 at Royal Roads Military College. "Periodontics for the General Practitioner" was presented by LCol D. Jones and Maj C. Hawkins. A very enjoyable mess dinner followed at the CFB Naden Wardroom.

12 Dental Unit

Conference/Mess Dinner

On 25 Feb 82 the Unit conference was held at CFB Shearwater followed by an all ranks mess dinner the same evening. In attendance were military and civilian



BGen Thompson presents the CFDS Plaque to LCol Bob Fortier during the farewell dinner.



Two promotions at once !!



(L-R) LCol MN Deyette, Dr. Tom Erskine, Dr. Rex Fortesque, LCol D. Jones and Maj C. Hawkins



Late LCol R. Carver is presenting Capt P. Bosch his new ranks.



BGen Thompson cuts the ribbon assisted by Col Taylor (right) and Col Troughton.



Mrs. Frances Brown receives her retirement certificate from the hands of BGen Thompson.

personnel of the Unit and three guests in the persons of BGen Thompson, Maj Boulanger and CWO(W) Patterson (total of 97 persons). Informative briefings were presented by the two Career Managers during the conference. Also a most enjoyable time was held at the mess dinner and the unit utilized the opportunity to say farewell to BGen Thompson upon the occasion of his forthcoming retirement.

Rocking Dental Assistant

The following is reprinted by kind permission of the CFB Shearwater newspaper THE WARRIOR:

"She is not Whistler's Mother, nor is she Grandma Moses, but on Saturday, 1 May, at Dartmouth General Hospital Rockathon, she was Queen of the Rockers. Leslie Gardner, a 21 year old service woman from CFB Shearwater single handedly raised \$1,450.00 in pledges for a most worthwhile cause. I am certain this lovely, intelligent young lady who is a Dental Assistant on Base, could have found many other ways to spend her time, but because she cares for others and believes that we all have an obligation to help, she volunteered to be the Base's representative in this event. Leslie personally conducted her own pledge campaign in the limited time she had at her disposal and probably could have tripled the amount pledged with more time and assistance. A grand total of \$5,000.00 was raised at the



Leslie Gardner in her rocking chair.

Rockathon — Shearwater's Leslie Gardner raised 25% of that sum. In an era when we hear and read nothing but negative stories of youth, we are extremely proud to salute youth in general and Leslie in particular, for a job well done — it certainly puts a lie to the old saying "youth is wasted on the young"."

Promotion Capt Bosch

Capt Bosch now working as a DAO with 12 Dental Unit, is another deserving member of our dental personnel. This gentleman, after a deserving twenty years of service, has been commissioned and promoted to the rank of Captain. He enrolled on 10 July, 1962 as an apprentice, being only 16 years of age. He served as a clerk for the three first years and then remustered to the 722 trade. He has since then brought his contributions to most units in Canada. Congratulations and best of luck in your new appointment.

13 Dental Unit

DGDS Opens Kingston Clinic

October 30, 1981 saw the official opening of the expanded and refurbished dental clinic at CFB Kingston. The Clinic now has seven operatories, a new preventive dentistry room, a new assistants' laboratory, an expanded orderly room and a new office for the Base Dental Officer. BGen Thompson was the guest of honour and cut the ribbon to officially open the clinic assisted by Col Taylor, CO 13 Dental Unit, Col Troughton, BComd CFB Kingston. After the ribbon cutting and a tour of the clinic, several presentations were made at a champagne reception hosted by the clinic staff. WO Nelson Highfield received the clasp to the CD, and Mrs. Frances Brown was presented with a certificate to mark her retirement after 21 years as a civilian dental assistant at CFB Kingston. Later, a sit-down luncheon was held at the Officers' Mess to mark BGen Thompson's visit and the opening of the clinic. Special thanks must go to Maj Ron Woodworth, B Dent O, and WO Nelson Highfield for their parts in arranging the remodeling and opening of the clinic.

Special Presentation to DGDS

Shortly before retirement of Gen Thompson, Capt L.D. Martin drove from Petawawa to present DGDS with this fantastic replica of the Dental Services Crest made out of stained glass.

Capt Martin wished to emphasize his appreciation to the dental organization and its Director General before leaving the CFDS.

Receives Commandant's Commendation

Cpl Louthers F.E., from CFB London, recently received the Commandant CFTS Commendation for his prompt action in saving the life of a three year old child on 21 August 1980.

14 Dental Unit

Commissioning Scrolls

On 17 March 1982, at Air Command Headquarters Colonel L.A. Richardson, CO 14 Dental Unit, presented Commissioning Scrolls to (from R to L) 2Lt D. J. Brevik, 2Lt D.P. Van Berkel, and 2Lt R.K. Yahiro.

All are DOTP students attending the University of Manitoba. 2Lt Brevik and 2Lt Van Berkel are in their third year and 2Lt R.K. Yahiro is completing his fourth year and is posted to Dental Detachment Moose Jaw.

15 Dental Unit

Capt R. Savoie Retires

On 14 Apr 82, CFB Montreal hosted Capt R. Savoie at a mess dinner to mark his retirement from the Canadian Forces. Dental officers from St-Hubert attended and had a good time. On 26 Apr 82, dental officers of the unit along with DGDS and officers from the Division hosted him at a dinner and "games night". Among other gifts, Capt Savoie was presented with the CFDS flag.

It is always sad to say goodbye to a friend but Capt Roger Savoie's sense of humour will not be forgotten for a long time. Capt Savoie joined the Dental Corps on



Stained Glass Crest

8 Jul 50 and served in all units except 13 Dental Unit during his career. He was commissioned in 1966 and as a dental supply officer has seen duties at numerous dental depots. His departure from Petawawa in 1978 was followed a few months later by the closure of the last remaining dental depot. Roger retired on 31 Jul 82 after 32 years of service. He has settled in St-Bruno, Qué. and proposes to work for the Department of Health and Welfare of Canada in Montreal. Our best wishes are extended to Roger and Elizabeth.

Promotion Capt J. Pouliot

Capt. J. Pouliot is another member of the dental team who has been honoured for his high contribution to the dental services by being offered a commission. He also was given two promotions when he became a MWO and a Captain in the same week.

Ice Sculpture at Bagotville

Who says that a posting to Bagotville is not pleasant and rewarding? The accompanying photograph depicts the first prize winner for ice sculptures during the last Winter Carnival. The "artists" have been asked to participate at the International Ice Sculptures competition to be held at the "Chantier du Père Alex" during the next Canadian Winter Games. Cpl Gallant can be seen working on the printing machine while WO Côté is facing Sgt



Col Taylor presents Cpl Louthers with his Commendation in the presence of Major Sasse.



(from R. to L.) 2Lt D.J. Brevik, 2Lt D.P. Van Berkel, Col L.A. Richardson and 2Lt R.K. Yahiro



Capt J. Pouliot, CD, is being presented his commission by BGen R.P. Beaudry, CD1, as LCol L. Bourget, CD1, is making sure it is being done "our way".



Capt Savoie, CD1, is receiving the symbol of 32 years of loyal service as Col Begin, CO of 15 Dental Unit is presenting him with the CFDS flag.



Ice Sculpture



A EVENT PHOTO

(L. to R.) Max Fisk, John Clint, MWO Jack Fraser and Bob Goodwin receive the Wansborough trophy from BGen Thompson.



B EVENT PHOTO

(L. to R.) MWO Bob Gaylor, LCol Bill Gray, Col Murray Donely, (Polly Ruck missing), are presented the RCDC(R) Trophy by BGen (ret'd) Baird.



C EVENT PHOTO

(L. to R.) Maj Dan Fraser, LCol Gen Gunther, LCol Bob Fortier and Col Jim Wright accept happily the WO & Sr. NCO Trophy from Maj (ret'd) Hunt.

Genest's furnace and Major Ayotte is patting his dog. The theme for the sculpture was the interior of the first printing office. The event was covered by the local paper "Le Quotidien" and was shown on local T.V.

CFDSS

20th Annual CFDS Bonspiel

The Canadian Forces Dental Service School hosted the 20th Annual Canadian Forces Dental Services Bonspiel from 4-6 February 82. It once again proved to be a highly successful event.

The Bonspiel, which is open to all serving, retired and former members of CFDS or RCDC, attracted 128 curlers (32 teams) from across Canada and Europe. 157 people attended the closing banquet.



D EVENT PHOTO

(L. to R.) Capt Camil Maziade, Cpl Carole Comtois, Col Fred Begin, Maj Thérèse Michaud-Girouard were the winners of D event.



The Meet and Greet was held on Thursday, 4 Feb 82. This was again an exuberant event enjoyed by everyone. We even arranged to have a few "high-flying" B-52 pilots, commanded by Major Greg Ames from Calgary.

The curling competition began early Friday morning, at both the Anderson Park and Circled Pine rinks with the finals in the four events taking place on Saturday afternoon.

The Bonspiel concluded with the awards banquet on Saturday night. It was held this year at the Homestead Restaurant which made a nice change. The head table guests included BGen W.R. Thompson, DGDS; BGen (ret'd) B.P. Kearney, Colonel Commandant CFDS; Col M. Donely, Commandant CFDSS; Col J.N. Wright, DDTs; Col L. Richardson, CO 14 Dental Unit; Col A. Taylor, CO 13 Dental Unit; Col H. Brogan, CO 12 Dental Unit; Col F. Begin, CO 15 Dental Unit; LCol V. Lanctis, CO 1 Dental Unit. Other distinguished guests included Col (ret'd) R. Covey, Col (ret'd) H. Protheroe, Major (ret'd) C. Hunt, President of the RCDC Association, and LTC Kent Percy, United States Army Dental Corps and Director of the General Residency Program, Fort Knox, KY.

BGen Thompson addressed the gathering but forewent the annual "State of the CFDS" address to say a few farewell words. On behalf of all the assembled curlers, General Thompson congratulated Major Bill Wiseman and his bonspiel committee on their fine job of organizing the 20th bonspiel.

The entire 3-day event was marked by only one incident. The CFDS's only RCDC flag, an irreplaceable trophy, was appropriated from the banquet hall. Would the perpetrators *please* return the flag to the School. Enough said!

Please remember that it is your participation in this Bonspiel which makes it so successful. Make plans to attend the 21st Annual Bonspiel now, tentatively, 18 and 19 February 1983.

DGDS Retirement Mess Dinner

On 2 June, 1982, serving and retired officers of the RCDC/CFDS honoured BGen and Mrs. W.R. Thompson, at a formal mixed "mess dinner" on the occasion of BGen Thompson's retirement from the Canadian Forces. Gen Thompson's retirement culminated 36 years of service, the last 6 of which were as Director General of Dental Services. The dinner was attended by members of the Thompsons' family as well as military and civilian dignitaries. Special presentations and tributes were given by BGen (ret'd) B.P. Kearney, Colonel Commandant; BGen J.N. Wright, DGDS Designate; MGen (ret'd) R. Shira, former Chief of US Army Dental Corps and former Dean, Dental Faculty, Tufts University; and Major (ret'd) C.G. Hunt, President of RCDC Association. Mrs. Elaine Wright also presented a bouquet of roses to Mrs. Thompson. Other distinguished guests included MGen G. Kuttas, Chief of US Army Dental Corps; BGen (ret'd) K.M. Baird, former DGDS and Col Comdt; Col (ret'd) G.R. Covey, Col Comdt designate; Dr. D.E. Williams, President of Canadian Dental Association; and MGen N. Freeman (NDHQ). LCol R.A. Fortier, member of the Division staff, officiated as PMC for the occasion.

"The Serenade of Strings", a courtesy of "The Central Band of the Canadian Forces", directed by WO G. Hunter, provided the guests with a very enjoyable musical program. Cpl P.F. Capka, a member of 1 Dental Unit, added colour to this prestigious gathering by volunteering his talents as piper. Other members of 1 Dental Unit formed an Honour Guard to welcome the guests on this memorable occasion.



On behalf of retired and serving members of the RCDC/CFDS, BGen (retired) B.P. Kearney presents to BGen Thompson (left) a limited edition CF ceremonial combined services sword; (middle) a bronzed bas relief depicting a mobile field dental unit in action which was sculptured by Col André Gauthier; and (right) Maj (retired) C.G. Hunt, on behalf of the members of the RCDC Association, presents to BGen Thompson a limited edition fine porcelain Kriehhof plate.

Au nom des membres à la retraite et en service du CDRC/SDFC, le Bgénéral (à la retraite) B.P. Kearney présente au Bgénéral Thompson (à gauche) une épée de cérémonie à exemplaire restreint, estampée des blazons des différents services des FC; (centre) un bas-relief en bronze reproduisant une scène d'une unité dentaire de campagne en action, laquelle fut sculptée par le Col André Gauthier. (À droite) le major (à la retraite) C.G. Hunt présente au Bgénéral Thompson, au nom des membres de l'Association du CDRC, une assiette de collection de Kriehhof.

Other Ranks Honour BGEN W.R. Thompson

On 10 Jun 82, the other rank members of the CFDS hosted BGen W.R. Thompson at a Retirement Dinner at the WO's and Sgt's Mess, CFB Trenton. Unfortunately, due to limited space available, attendees were restricted to a total of 70, however, all units were well represented.

Prior to the dinner, Mrs. Thompson was presented with a

bouquet of roses by WO Donna Thompson. At the dinner, BGen Thompson received a number of lovely gifts to mark the very special occasion.

This was a very unique evening and a first for the CFDS, whereby the other rank members of our corps had the opportunity to honour a retiring DGDS at a retirement dinner.



(R to L) MWO Jack Fraser, WO Ian MacLean and Sgt Patty Tweed present BGen W.R. Thompson with a set of luggage.

(D à G) L'Adjm Jack Fraser, l'Adj Ian MacLean et le Sgt Patty Tweed offre un ensemble de valises de voyage au Bgénéral W.R. Thompson.



Mrs. Thompson accepts from the hands of BGen Wright an antique tea pot with stand and warmer, presented to her on behalf of all serving and retired RCDC/CFDS officers.

Mme Thompson reçoit des mains du Bgénéral Wright une théière ancienne avec support et réchaud qui lui est présentée au nom de tous les officiers en service et à la retraite du CDRC/SDFC.



Dr. Shira (Major General retired) offers BGen Thompson a present on behalf of himself and his wife.

Le Dr. Shira (Mgénéral à la retraite) offre au Bgénéral Thompson un cadeau en son nom et celui de son épouse.

Dîner régimentaire pour la retraite du DGSD

Le 2 juin 1982, les membres en service et à la retraite du CDRC/SDFC ont honoré le Bgénéral et Mme W.R. Thompson lors d'un dîner régimentaire mixte à l'occasion de la retraite du Bgénéral Thompson des Forces canadiennes. La retraite du général Thompson culmine 36 années de service, ayant passé les 6 dernières comme Directeur général du Service dentaire. Quelques membres de la famille et certains dignitaires civils et militaires étaient également présents. Plusieurs cadeaux et hommages furent présentés par le Bgénéral (à la retraite) B.P. Kearney, Colonel Commandant; le Bgénéral J.N. Wright, DGSD désigné; le Mgénéral (à la retraite) R. Shira, ancien Chef du Corps dentaire de l'Armée des États-Unis et ancien Doyen, Faculté de Médecine Dentaire de l'Université de Tufts; et le major (à la retraite) C.G. Hunt, Président de l'Association du CDRC. Mme Elaine Wright présenta un bouquet de roses à Mme Thompson. Parmi les autres distingués invités l'on comptait: le Mgénéral G. Kuttas, Chef du Corps dentaire de l'Armée des USA; le Bgénéral K.M. Baird, ancien DGSD et Colonel Commandant; le Colonel G.R. Covey, Colonel Commandant désigné; le Dr. D.E. Williams, Président de l'Association dentaire canadienne; et le Mgénéral N. Freeman (QGDN). Le Lcolonel R.A. Fortier, membre du personnel de la Division, agissait comme PCM pour l'occasion.

Les sous-officiers honorent le BGEN Thompson

Le 10 juin 1982, les sous-officiers du SDFC ont honoré le Bgénéral Thompson à l'occasion de sa retraite des FC. lors d'un dîner régimentaire qui eût lieu au Mess des Adjudants et Sergeants à la BFC Trenton. Le manque d'espace a limité à 70 le nombre des invités, cependant toutes les Unités furent représentées.

L'Adj Donna Thompson présenta avant le dîner un

bouquet de roses à Mme Thompson. Pour marquer cette occasion mémorable plusieurs cadeaux furent également offerts au Bgénéral Thompson (voir photos).

Cette rencontre était unique en son genre du fait que c'était la première fois que les sous-officiers du "Corps" avaient l'opportunité d'accueillir à un dîner régimentaire d'adieu un DGSD prenant sa retraite.



(R to L) CWO Roy Matheson presents a picture of the CFDS mounted on a wooden plaque while Pte Laura Young presents a desk lamp to BGen Thompson.



(D à G) L'Adj Roy Matheson présente une photo en couleur montée sur plaque de bois alors que le Sdt Laura Young présente une lampe de bureau au Bgénéral Thompson.

Le groupe "La Sérénade à Cordes", une courtoisie de la "Fanfare centrale des Forces canadiennes", dirigé par l'Adj G. Hunter, offrit aux invités un programme musical des plus agréables. Le Cpl P.F. Capka, un membre de la 1^{ère} Unité dentaire, ajouta de la couleur à cette réunion prestigieuse en offrant volontairement ses talents de cornemusier. D'autres membres de la 1^{ère} Unité formèrent une Garde d'Honneur pour souhaiter la bienvenue aux invités en cette journée mémorable.