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Parapharyngeal abscesses

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Abstract

Fifty-five patients with deep neck infections treated consecutively over a period of six and a half years between January 1983 and July1989 were reviewed. Nine of these patients had abscesses localized to the pharapharyngeal space and form the basis of this study. The aetiology of the parapharyngeal abscess was odontogenic in two patients and remained unknown in the other seven. Five patients had associated systemic disease; four were diabetics and one patient had non-Hodgkin's Lymphoma.

High dosage intravenous antibiotics directed towards the causative micro-organisms, airway control and early surgical intervention was the mainstay of treatment. All patients underwent open surgical drainage of the parapharyngeal abscess within 24 h of admission. Bacteriology results showed *Klebsiella* sp. to be the dominant micro-organism cultured in four patients. Morbidity was low; seven patients had no post-operative complications and were discharged from the hospital between 7–24 d (mean 12.9 d). There were two deaths.

Early open surgical drainage remains the most appropriate method of treating parapharyngeal space infections; it avoids life threatening complications with rapid recovery.

Introduction

The parapharyngeal space is an important potential space in the neck that not only offers a path of minimal resistance to the growth of tumours of the head and neck but also to the spread of infection which can localize in this space to form an abscess. Parapharyngeal space infection may complicate pharyngeal infections. Additional antecedent conditions include molar tooth infection, gingivitis and mastoiditis (Bezold's abscess). Infections from the neighbouring compartments may extend to the parapharyngeal space via the styloglossus muscle plane from the floor of the mouth, parotid space and other continuous spaces such as the masseteric space, peritonsillar space, submandibular space and the submandibular gland (Paonessa and Goldstein, 1976). Untreated, the infection may spread to the retropharyngeal space and descend to the mediastinum (Eliachar *et al.*, 1981). Jugular thrombophlebitis, postangial sepsis (Hadlock *et al.*, 1979), cavernous sinus thrombosis (Harbour *et al.*, 1984) and haemorrhage from carotid artery (Langenbrunner and Dajani, 1971) may result when the infection involves the great vessels.

Anatomy of the parapharyngeal space (Figs. 1 & 2)

The parapharyngeal space (pharyngomaxillary space, lateral pharyngeal space) is a funnel shaped space with its base on the base of the skull and its apex at the greater cornu of the hyoid bone. The medial border of this space is formed by the superior constrictor muscle and the tonsillar fossa. The lateral boundary is formed respectively from anteriorly to posteriorly by the medial pterygoid muscle, the medial surface of the ramus of the mandible, the deep lobe of the parotid gland and the posterior belly of the digastric muscle. The junction of the buccinator and superior constrictor muscles which forms the pterygomandibular raphe represents the anterior limit. The posterior boundary is the vertebral column and the prevertebral muscles (Paonessa and Goldstein, 1976).

The space is divided into compartments by the stylopharyngeal aponeurosis. The anterior compartment contains connective tissue, muscles and lymph nodes. Irritation of the medial pterygoid muscle may result in trismus. The great vessels and lower cranial nerves run through the posterior compartment. Infections of this space are dangerous as it can spread inferiorly to the mediastinum and may involve the great vessels. The jugular vein may thrombose and act as a nidus for haematogenous dissemination of the infection (Hadlock *et al.*, 1979). Erosion of the carotid artery may lead to significant haemorrhage (Langenbrunner and Dajani, 1971).

Material and methods

The case records of all patients admitted for deep neck infections were retrieved and evaluated. Fifty-five patients with deep neck infections treated consecutively for a period of six and a half years between January 1983 and June 1989 at the Department of Otolaryngology, Singapore General Hospital were reviewed retrospectively. Based on clinical, radiological and operative findings, these 55 patients with deep neck infections were categorized into: Retropharyngeal Abscess (23 patients), Parapharyngeal Abscess (9 patients), Ludwig's Angina (18 patients)and Necrotizing Fasciitis of the neck (5 patients).

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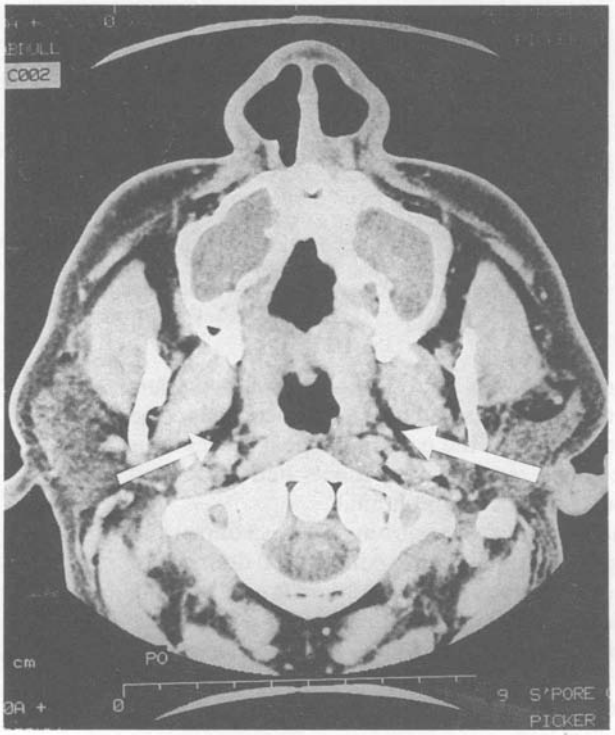

FIG. 1a
Computed axial tomographic scan at the level of atlas vertebra showing the parapharyngeal space (arrows).

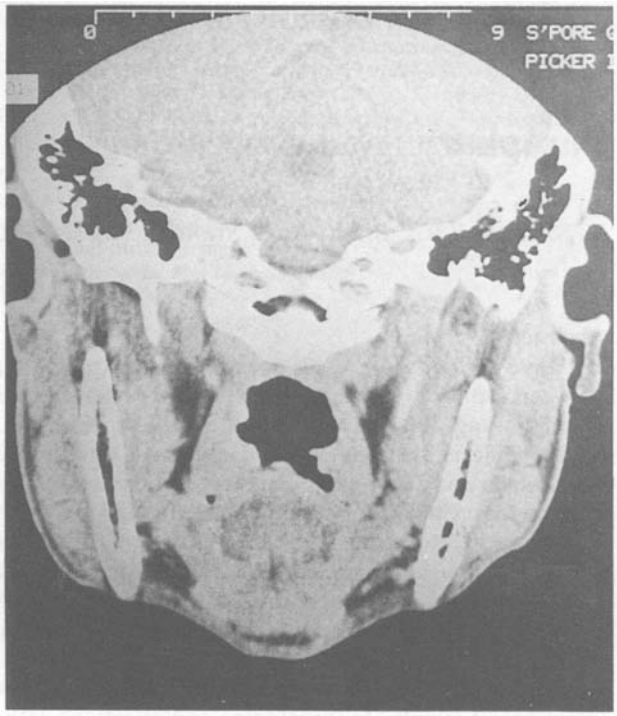

FIG. 2a
Computed tomographic scan (coronal section) at the level of styloid process showing the parapharyngeal space (arrows).

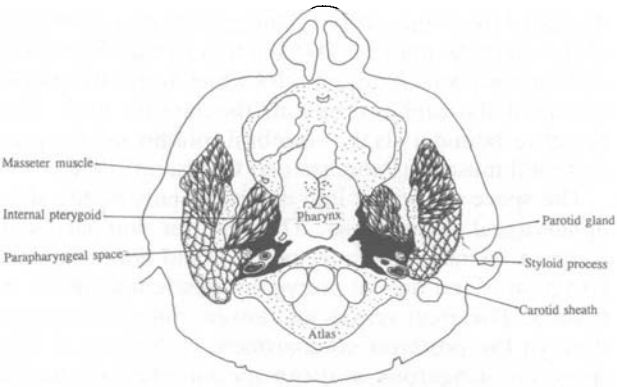

FIG. 1b
Graphic illustration of Fig. 1a.

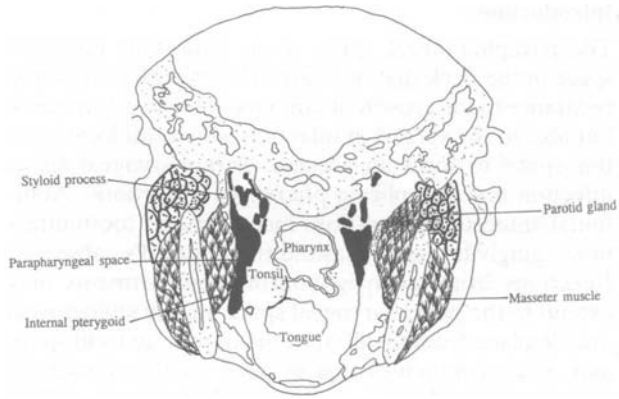

FIG. 2b
Graphic illustration of Fig. 2a.

Nine patients with proven parapharyngeal abscess form the basis of this study. Diagnosis of the parapharyngeal abscess was made from operative findings when the abscess was localized to the parapharyngeal space. Factors such as age, sex, clinical presentation, diagnosis, aetiology, bacteriology, therapy and complications were studied.

Results

Age and sex discrimination

The age range was 14 years to 77 years (mean 44.5 years). Eight of the nine patients were more than 25 years of age. Eight patients were male and one female.

Clinical presentation (Tables I–III)

Pain and swelling of the upper neck were the commonest symptoms present in all patients. Eight patients had odynophagia for a mean of 7.4 d prior to presentation. One patient had left upper and lower wisdom tooth extraction 15 d prior to presentation. None of the patients were in acute respiratory distress on presentation.

Physical examination

All patients were febrile on admission (Temperature >37.4°C). The mean temperature on admission was 38.3°C (range 37.8°C to 39°C).

Swelling of the upper neck was the most common physical findings in all patients (Fig. 3). Fluctuance as a sign was positive in two and negative in seven patients. Pus was aspirated in five patients. Two patients had dental problems, one patient had upper and lower wisdom teeth extraction 15 d prior to presentation and pus could

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TABLE I
CLINICAL PROFILE OF NINE PATIENTS WITH PARAPHARYNGEAL ABSCESS

Patient	1	2	3	4	5	6	7	8	9
Sex/age	M/34	M/50	M/56	F/68	M/47	M/77	M/25	M/29	M/14
Duration of symptoms	15d	14d	7d	5d	3d	15d	15d	10d	10d
Systemic disease	–	Diabetic	Diabetic	Diabetic	–	–	Diabetic	Lymphoma	–
Aetiology	–	–	Odontogenic	–	–	–	Odontogenic	–	–
Bacteriology	*Klebsiella pneumoniae*	*Klebsiella pneumoniae*	*Staph. aureus*	*Klebsiella pneumoniae*	*Klebsiella pneumoniae & Pseudomonas aeruginosa*	–	–	–	–
Hospitalisation	7d	15d	14d	10d	36d	24d	7d	10d	10d
Mortality	–	–	–	Acute myocardial infarction	Aspiration pneumonia Perforated duodenal ulcer Burst abdomen Septicemia	–	–	–	–

be seen extruding from the extraction site, the other patient had severe periodontal disease with obviously loose left lower molars.

The classical signs of medial tonsillar displacement and lateral pharyngeal wall bulge was noted in one patient with left parapharyngeal abscess. Another patient had lateral pharyngeal wall bulge without any tonsillar displacement. Trismus as determined by reduced maximum incisor opening was noted in four patients. Two patients had mild supraglottic oedema but were not in respiratory distress.

Associated systemic disease

Five of the nine patients had associated systemic disease. Four patients had diabetes mellitus for a period ranging from 5–15 years. Two patients were well controlled with oral hypoglycaemic medication and one patient had been stabilized with semi-lente insulin. One patient was an undiagnosed diabetic and was controlled with combination of soluble insulin and semi-lente insulin on admission. The last patient was noted to have generalized lymphadenopathy and was subsequently diagnosed as non-Hodgkins Lymphoma.

Investigations

The mean white cell count was 20,200/mm^3 (range 11,300–36,1070/mm^3).

Postero-anterior views and lateral radiographs of the neck were done in all patients to exclude radiological evidence of retropharyngeal abscess and to radiologically assess the upper airway. The commonest radiological finding was mild soft tissue swelling of the upper prevertebral area in seven patients. There was no radiological evidence of upper airway obstruction in any of the nine patients.

Chest X-rays were obtained in all nine patients and were normal.

Orthopantograms of the mandible were obtained in four patients with suspected dental disease. One patient with severe dental caries had periapical lucencies consistent with periapical abscess.

TABLE II
CLINICAL PRESENTATION

Symptoms	No. of patients (n = 9)	Mean of duration of symptoms in days
Pain	⅞	8
Fever	⅝	7.4
Swelling	10/9	7.9
Odynophagia	⅝	7.4
Trismus	⅔	2
Respiratory distress	0	–
Recent tooth extraction	⅑	15

Hospitalisation

The mean period of hospitalization was 12.9 d (range 7–24 d) for the seven patients who were discharged from the hospital.

Aetiology

The source of infection was established to be odontogenic in two patients. In seven patients, the cause remained unknown as no definite focus of infection could be identified.

Anti-microbial therapy

High dosage intravenous antibiotics were started on admission. Ampicillin in combination with cloxacillin and metronidazole were the antibiotics administered in

TABLE III
PHYSICAL EXAMINATION*

Finding		No. of patients	Patient
Swelling		9	1–9
Fluctuance	Positive	2	7,8
	Negative	7	1,2,3,4,5,6,9
Aspiration	Positive	5	2,3,4,7,8
	Negative	4	1,5,6,9
Dental abnormalities		2	3,7
Oropharyngeal abnormalities**		2	1,5
Trismus		4	2,3,4,6
Supraglottic/Hypopharyngeal edema		2	4,5

* The mean temperature on admission was 38.3°C (range 37.8°C to 39°C).

** Medial tonsillar displacement and/or lateral pharyngeal wall bulge.

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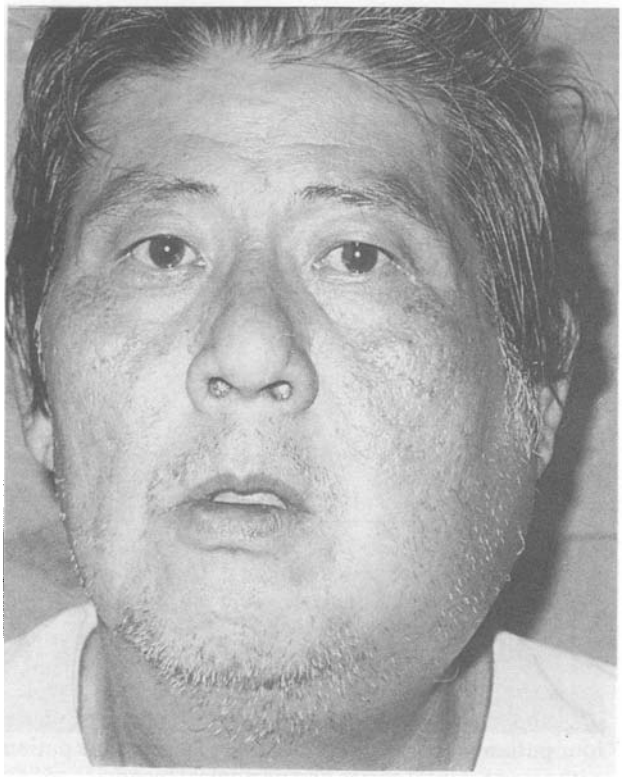

FIG. 3
Patient with left parapharyngeal abscess presenting with swelling of the left upper neck.

six patients. Crystalline penicillin in combination with cloxacillin was used in two patients. Rocephine and metronidazole were used in another two patients. Gentamicin was used selectively in three patients and amikacin in one patient where the cultures grew gram-negative organisms sensitive to gentamicin and amikacin.

Surgical management

All nine patients underwent neck exploration and drainage of the abscess under general anaesthesia.

Endotracheal intubation was not a problem in eight patients. One patient required a fibreoptic guided endotracheal intubation. None of the patients required preoperative tracheostomy or post-operative respiratory support.

Operative technique

An upper tranverse skin incision is placed 1 cm below and parallel to the body of the mandible to avoid the mandibular branch of the facial nerve was used in all patients. When the deep cervical fascia is encountered, the tail of the parotid and posterior end of the submandibular gland are identified. The parapharyngeal space is entered initially with a forceps. The abscess cavity is then explored with a finger as shown in Figure 4. All loculations are broken up with blunt finger dissection. The cavity is then adequately drained and drains are placed in the superior and inferior portion of the parapharyngeal space and the external incision is partially closed.

The parapharyngeal abscess was localized to the left parapharyngeal space in four patients; right parapharyngeal space in another four patients and was involving both parapharyngeal spaces in one patient. In this patient, the abscess also extended to the submandibular space on both sides. A moderate amount of pus was drained in all patients. All patients were extubated without any problems post-operatively and nursed in high dependency care unit in the general ward for 24 hours.

Post-operative complications

There were no major complications in seven patients. They were discharged from the hospital between 7–24 d (mean 12.9 d) after admission.

Mortality

There were two deaths. One patient suffered acute myocardial infarction on the second post-operative day and died of cardiac failure on the tenth post-operative day. Another patient developed aspiration pneumonia on the second post-operative day and a perforated duodenal ulcer on the seventh post-operative day. An emergency laparotomy and repair of the perforated duodenal ulcer with truncal vagotomy was done. He had wound breakdown and 'burst abdomen' post-operatively. Despite aggressive anti-microbial therapy, he developed Gram negative septicemia and died on the 36th day after admission.

Bacteriology

Pus obtained from the parapharyngeal abscess was

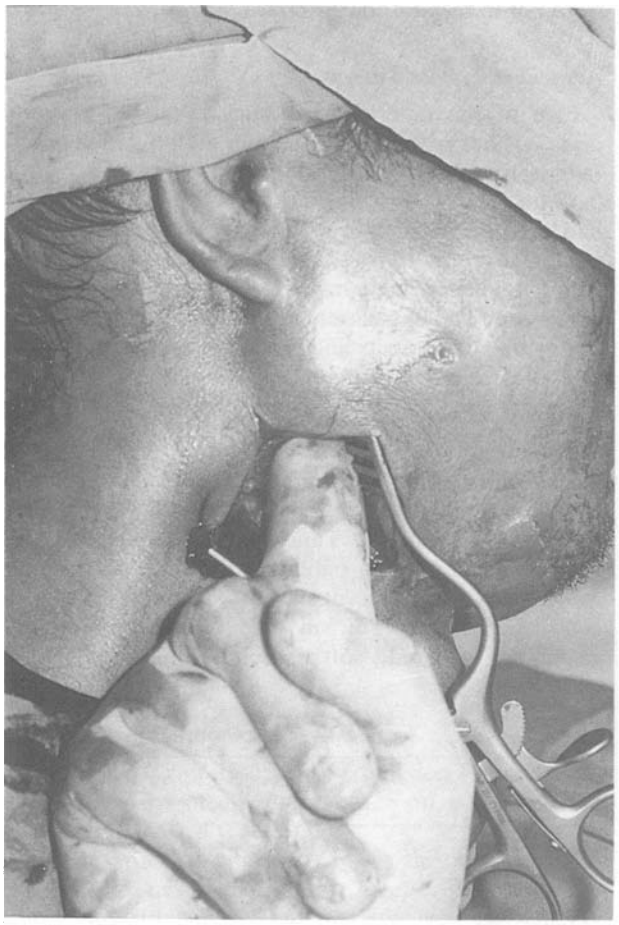

FIG. 4
'Blunt finger dissection' of the parapharyngeal abscess to breakdown the loculations.

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sent for culture in all patients. *Klebsiella pneumoniae* was the most predominant micro-organism cultured in four patients (Patients 1, 2, 4 & 5). Another patient grew *Pseudomonas aeruginosa* (Patient 5). *Staphylococcus aureus* was cultured in one patient (Patient 3). No bacterial growth was obtained in the remaining four patients. Anaerobic cultures were not done. Blood culture was done when septiaemia was suspected in patient 5; it grew *Klebsiella pneumonia.*

In four patients (Patients 1, 2, 4 & 5) Gram-negative micro-organism cultured showed resistance to the initial antibiotics, ampicillin and cloxacillin, and were sensitive to gentamicin and amikacin. The antibiotic therapy was adjusted to include gentamicin (Patients 1, 2 & 4) and Amikacin (Patient 5). *Staphylococcus aureus* cultured in patient 3 was also resistant to ampicillin and cloxacillin and sensitive to clindamycin, fusidic acid and vancomycin. No antibiotic adjustment was made in this patient as the patient had clinically improved by the time the sensitivity results were received.

Discussion

The incidence of parapharyngeal space infections has declined since the advent of antibiotics, however, the mortality associated with parapharyngeal space infections still remains high. There have been recent reports of descending suppurative mediastinitis (Eliachar *et al.*, 1981), jugular thrombophlebitis with septic pulmonary foci (Hadlock *et al.*, 1979) and cavernous sinus thrombosis (Harbour *et al.*, 1984) and carotid artery erosion (Langenbrunner and Dajani, 1971) resulting from parapharyngeal space infections.

Twenty to thirty per cent of parapharyngeal space infections begin in the teeth (Wills and Vernon, 1981). Odontogenic infections commonly involve the lower molar teeth (Chow *et al.*, 1978). Infections of the first molar and more anterior teeth which originate above the mylohyoid attachment to the mandible enter the sublingual space. Infections of the second and third mandibular molars and their root apices usually occur below the mandibular attachment of the mylohyoid muscle and discharge into the submandibular or masseteric space where the infection may extend to the parapharyngeal space (Beck *et al.*, 1984).

Other important primary foci of infection are pharynx and tonsils (via the lymphatics). However, the initial sore throat may clear by the time the infection in the parapharyngeal space manifests. This may account for a significant proportion of patients with unknown aetiologies for their neck abscess (Langenbrunner and Dajani, 1971; Tom and Rice, 1988).

In our series, an odontogenic source of infection was established in two patients. The remaining seven patients had a sore throat prior to admission but no definite foci of infection could be determined on physical examination. Four patients were confirmed diabetics which may be an aetiological factor.

An erythematous, tender, often non-fluctuant swelling typically at the angle of the mandible, in our experience, is the most consistent finding in patients with parapharyngeal abscess. All our patients presented with a swelling at the angle of the mandible. The swelling was fluctuant in two patients and pus was aspirated from the swelling in five patients. Trismus is an important sign of parapharyngeal space infection and results from irritation of the medial pterygoid muscle. Trismus may occasionally be an indication for a pre-operative tracheostomy as oral endotracheal intubation may be difficult in a patient with severe trismus. Four of our patients had trismus; however none posed any problems and the trismus improved within hours after surgical drainage of the parapharyngeal abscess. Medial displacement of the tonsil is a sign, characteristic of an expanding lesion in the parapharyngeal space. Only two of our patients presented with this sign. None of our patients presented with cranial nerve involvement or jugular thrombophlebitis.

The management of patients with parapharyngeal space infection must be aggressive. Once parapharyngeal space infection is established, high dose intravenous antibiotic therapy must be instituted and patient must be prepared for surgical drainage within the next 24 h (Langenbrunner and Dajani, 1971) which was so in all our patients.

Airway support should receive top priority in the management especially during induction as trismus may be a problem. A tracheostomy should be performed if respiratory obstruction is suspected or difficulty in intubation is anticipated.

Surgical drainage of the deep neck abscess has been widely recommended as the appropriate treatment of parapharyngeal space infections (Grodinsky, 1939). This has also been our experience. Seven of our patients had no post-operative complications and were discharged from the hospital between 7–24 d (mean 12.9 d).

A non-surgical approach in treating parapharyngeal space infection using high dose intravenous antibiotics and computed tomography guided selective aspiration has been reported by de Marie *et al.* (1989). The report describes eight patients with parapharyngeal space infection that were treated non-surgically. CT scans were used for initial punctures and aspirations and for follow-up to assess reponse to therapy. There is no mention of the number of times each patient had to be aspirated and the number of CT scans performed during the treatment period. The period of hospitalization of their patients was 14 –89 d (mean 38.9 d). In our experience, early open surgical drainage is the mainstay of treatment of parapharyngeal abscesses which has resulted in rapid recovery and short hospital stay.

Early studies of the bacteriology of deep neck infections have emphasized three micro-organisms; *Staphylococcus aureus, Streptococcus pyogenes* and anaerobic bacteria (Bartlett and Gorbach, 1976). More recent studies have emphasized the polymicrobial nature of these infections. Streptococci and various species of anaerobes including Fusobacterium species, Bacteroid species, peptococci and peptostreptococci have been implicated in deep neck infections. Coliforms have been reported to be uncommon pathogens in deep neck infections (Bartlett and Gorbach, 1976). In our patients *Klebsiella pneumoniae* emerged a a dominant pathogen in four patients. *Staphycoccus aureus* was identified in one patient. Unfortunately anaerobic cultures were not done because all patients had surgical drainage of the abscesses as an emergency procedure during the night

and facilities for anaerobic cultures were not available at that hour. Cultures were negative in four patients. The inability to culture a pathogen in these four patients may suggest an anaerobic pathogen. Liberal use of antibiotics prior to admission and high dose intravenous antibiotics prior to surgical drainage of the abscess may have also resulted in negative cultures.

There were no major post-operative complications in seven of our patients. High dosage intravenous antibiotic therapy was continued post-operatively in all patients for a variable period of 5–15 d. Seven patients achieved complete cure and were discharged from the hospital between 7–24 d (mean 12.9 d).

There were two deaths. These were crude mortalities and resulted from causes other than parapharyngeal abscess. The cause was cardiogenic in one patient and complications resulting from abdominal surgery in the other patient.

Conclusion

Parapharyngeal space infections must be recognized early to avoid life threatening complications that may ensue. Based on our experience, we recommend an early open surgical drainage of the abscesses. Airway control should receive top priority in the management of parapharyngeal abscess. High dose intravenous antibiotics should be started directed to the possible causative organisms. The bacteriology pattern of parapharyngeal space infection, in our experience, is changing. Coliform organisms particularly *Klebsiella* sp. have emerged as a dominant pathogen and should be considered when planning the antimicrobial therapy of patients with deep neck abscess.

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Key words: Parapharyngeal abscess.

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