ORIGINAL ARTICLE

Surgical Access to Parapharyngeal Space Tumours - The Manipal Experience

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Summary

A few series of parapharyngeal space tumours have been reported earlier but recently not many series have been published in English literature. It is rare for any medical center, let alone an individual surgeon, to develop sufficient experience in evaluating these tumours. We present our experience in the treatment of 41 cases of parapharyngeal tumours from January 1992 to December 2001. FNAC, ultrasound and CT scan of the presenting mass was done in most of the patients as the main pre-operative work-up. The strategic location and extension of the tumour may occasionally alter the surgical approach for tumour excision.

Key Words: Parapharyngeal space, Transcervical, Cervicoparotid, Transmandibular

Introduction

The surgical access to parapharyngeal space tumours is limited and difficult. This is because it is a blind space enclosing important neurovascular structures with the tumour occasionally arising from the nerve sheath itself. In view of the above, a careful meticulous dissection is required via a safe approach like the cervical, the cervicosubmaxillary or the cervicoparotid approach. Mandibulotomy is an option for better exposure and is the individual surgeon's choice. Though few series have been earlier reported, recently not many reports are seen. We present our experience in 41 cases with the above approaches highlighting the use of CT scan, MRI, angiography, ultrasound and FNAC as a diagnostic tool. Attempts have also been made to correlate histopathologic report with surgical approach.

Materials and Methods

A retrospective study from January 1992 to December 2001 of 41 cases with age range 7 to 67 years presenting with a parapharyngeal mass was taken up for the study. FNAC, ultrasound and CT scan (Figure 1a & 1b) with or without sialogram were done for diagnosis, localisation of the tumour and relation of the tumour to the neurovascular bundle. Digital substraction angiography was done in cases where there was enhancement on CT Scan. Surgical approach was determined after assessing the type of tumour and location i.e. whether lying high or low in the parapharyngeal space and it's relation to the mandible. We adopted a cervical (Figure 2) or cervicosubmaxillary approach in case of neurogenic tumours and a cervicoparotid approach for salivary tumours, with or without mandibulotomy. The cervical approach was converted to a cervicosubmaxillary approach where the submandibular gland was removed for better tumour exposure. A mandibulotomy was done selectively for better exposure and to aid complete tumour removal (Figure 3).

This article was accepted: 4 July 2003

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Results and Analysis

The symptoms encountered are shown in Table I. The commonest symptoms were found to be lump in the throat and neck mass. FNAC was conclusive in 64.7% (22/34) and 86.36% (19/22) were true positive while correlating the FNAC findings with histopathology report of the excised tumour (Table I). The cervical approach was employed more commonly since it was found to be a versatile approach applicable to neurogenic, salivary and other tumours which in this study included osteolipoma, synovial sarcoma, paraganglioma, branchial cyst, malignant fibrous histiocytoma and mesenchymal chondrosarcoma. Mandibulotomy was done in ten cases of cervical approach, two of cervicoparotid and four of cervicosubmaxillary; of these seven were paramedian, seven angular and two lateral stair step. All the tumours reported to be malignant did not have skull base extension. In eight cases modified neck dissection was done where neck nodes were clinically palpable. All were negative on histopathology. In total, there were 37 benign tumors and 4 malignant tumors (Table I). The case of malignant fibrous histiocytoma and malignant schwannoma had steroid therapy and chemotherapy respectively besides a course of post-operative radiotherapy. Permanent sequelae as a result of surgery was present in 21.95% of cases. These include hoarseness, shoulder droop, Horner's syndrome and dysarticulation. Parotid fistula was present in two cases after salivary gland tumour excision that healed with conservative treatment. All the patients have good prognosis on 2 years to 7 years follow up except the patient with mucoepidermoid carcinoma who was lost to follow up. One case with preoperative vocal cord palsy improved after the tumour excision.

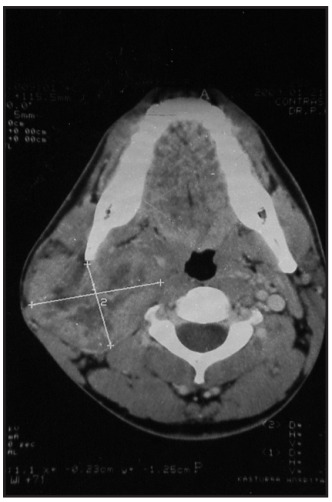

Fig. 1a

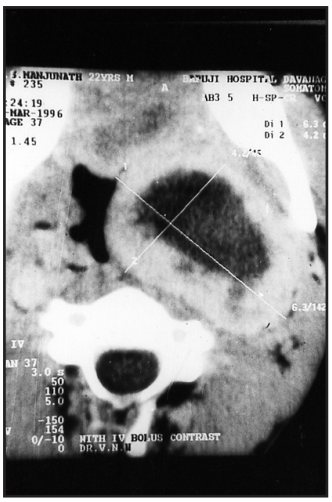

Fig. 1b

Fig. 1: CT scan with contrast

a. Case No.34 – Heterogeneously enhancing right parapharyngeal mass displacing the great vessels anteriorly.

b. Case No.38 – Left parapharyngeal mass showing peripheral enhancement and central necrosis.

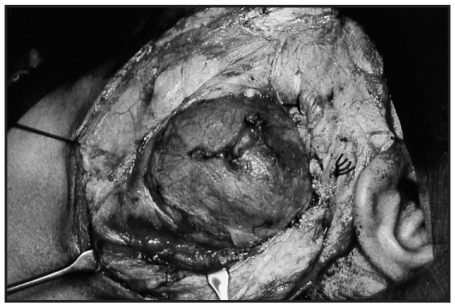

Fig. 2: Exposure of tumour by transcervical approach

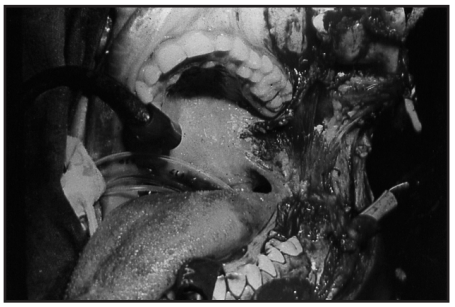

Fig. 3: Transcervical approach with mandibulotomy showing the parapharyngeal space post tumour removal

Table I: Symptoms encountered

Sl. No.	Hosp. No.	Age/Sex	Side	FNAC	Presentation	DOS	Approach	Histopathology	ND	RT/CT	Complication
1	0858156	61/M	R	Inconclusive	Neck mass	29-2-92	CP	Mucoepidermoid ca	-	-/-	
2	0709137	30/M	R	Schwannoma	Neck mass	28-9-92	C	Schwannoma	-	-/-	
3	0696938	28/M	L	Pleomorphic adenoma	Neck mass + FB sensation	5-12-92	C+M	Pleomorphic adenoma	-	-/-	
4	0751818	30/F	L	Schwannoma	Neck mass	26-5-93	C	Schwannoma	-	-/-	
5	0788368	67/M	R	Liposarcoma	Neck mass	15-8-93	C	Mali.Fib.Histiocytoma	-	-/-	
6	0801169	30/M	L	Inconclusive	Mass throat	18-9-93	C+M	Pleomorphic adenoma	-	-/-	
7	0763342	30/M	L	Inconclusive	Mass throat	21-9-93	CP+M(S)	Schwannoma	+	-/-	Hoarseness
8	0843188	21/M	L	Inconclusive	Mass throat + voice change	21-3-94	C+M	Schwannoma	-	-/-	
9	0851745	40/M	R	Pleomorphic adenoma	Neck mass	14-5-94	CP	Pleomorphic adenoma	-	-/-	
10	0877429	65/M	L	Warthins tumour	Neck mass	26-9-94	CP+M	Warthin's tumour	-	-/-	
11	0884295	42/F	R	Inconclusive	Voice change	8-11-94	C	Schwannoma	-	-/-	Hoarseness Horner's syn. dysarticulation
12	0865756	25/M	R	Pleomorphic adenoma	Odynophagia + mass in throat	5-12-94	CP	Pleomorphic adenoma	-	-/-	
13	0862453	16/F	L	Schwannoma	Neck mass	17-1-95	C+M(S)	Malignant Schwannoma	+	+/+	Dysarticulation
14	0907214	53/M	R	Warthins tumour	Neck mass + ear block	28-2-98	CP	Warthin's tumour	-	-/-	Parotid fistula
15	0918107	53/M	R	Pleomorphic adenoma	Neck mass	24-3-95	CP	Pleomorphic adenoma	-	-/-	
16	0907214	39/M	L	Oxyphil adenoma	Neck mass + dysphagia	3-4-95	CP	Pleomorphic adenoma	-	-/-	Parotid fistula
17	0913288	51/M	L	Warthins tumour	Neck mass	24-4-95	C	Warthin's tumour	-	-/-	
18	0936763	25/F	L	Branchial cyst	Neck mass+ dysphagia	16-6-95	C	Branchial cyst	-	-/-	
19	0962919	18/M	R	Pleomorphic adenoma	Lump in throat	30-10-95	CP	Pleomorphic adenoma	-	-/-	Facial paralysis
20	0966914	31/M	R	Schwannoma	Voice change	3-11-95	C+M	Schwannoma	-	-/-	Dysphagia
21	0994963	21/M	L	Schwannoma	Lump in throat	14-4-96	C	Schwannoma	+	-/-	
22	1010276	36/F	L	Inconclusive	Lump in throat + neck mass	8-6-96	C+M	Schwannoma	-	-/-	

Sl. No.	Hosp. No.	Age/Sex	Side	FNAC	Presentation	DOS	Approach	Histopathology	ND	RT/CT	Complication
23	1007750	30/F	L	Schwannoma	Neck mass + dysphagia	24-6-96	C(S)	Schwannoma	-	-/-	Hoarseness
24	0763342	30/M	R	Inconclusive	Neck mass+dysphasgia	5-2-97	C+M(S)	Primary meningioma	+	-/-	Hoarseness
25	1074518	45/F	R	Schwannoma	Lump in throat	28-4-97	C+M(S)	Schwannoma	+	-/-	Dysarticulation
26	1137995	23/M		Schwannoma	Neck mass	31-1-98	C	Schwannoma	-	-/-	
27	1118580	32/F	L	Schwannoma	Neck mass	18-12-97	C	Schwannoma	-	-/-	
28	1324203	32/F	L	-	Dysphagia+L Vocal cord palsy	8-8-00	C+M	Paragangl1oma	-	-/-	
29	1388485	43/F	L	-	Neck pain	24-5-01	C+M	Paragangl1oma	-	-/-	postembolisation (L) blindness + post op.(L) vocal cord palsy
30	1394333	20/M	R	Inconclusive		23-6-01	C+M(S)	Myxold neurofibroma	-	-/-	
31	1366870	36/M	R	Inconclusive	neck swelling + horners syndrome	12-7-01	C	Schwannoma	-	-/-	
32	1355027	33/M	R	Benign mixed salivary tumour	Swelling in throat + ear block	19-1-00	C+M	Pleomorphic adenoma	-	-/-	
33	1350229	25/F	R	-	Neck swelling+otalgia	18-11-00	C	Synovial sarcoma	-	-/-	
34	1289798	25/M	R	Inconclusive	10&12 palsy + neck swelling	27-1-00	C	Schwannoma	-	-/-	
35	1210898	26/F	L	-	Neck swelling	23-10-00	CP	Pleomorphic adenoma	-	-/-	
36	1284355	24/M	R	Inconclusive	Neck pain + vocal cord palsy	3-2-00	C	Schwannoma	-	-/-	
37	1274688	17/F	R	Inconclusive	Dysphagia+tinnitus	16-11-99	C+M	Osteolipoma	-	-/-	
38	1231775	23/F	R	-	Lump in throat neck pain	29-4-99	C	Schwannoma	-	-/-	(R) vocal cord palsy
39	1376480	44/F	L	-	Neck swelling	20-3-01	C	Paraganglioma	-	-/-	
40	1165896	7/F	R	-	Epistaxis	18-6-98	C(S)	Mesenchymal chondrosarcoma	-	-/-	
41	1294830	44/M	L	Schwannoma	Neck swelling XII & X palsy	2-3-00	C+M	Schwannoma	-	-/-	Recurrence at jugular foramen and CP angle

R = Right L = Left Hosp.No.= Hospital No. CP = Cervicoparotid C = Cervical M = Mandibulotomy
S = Submaxillary ND = Neck Dissection RT = Radiotherapy CT = Chemotherapy

Discussion

The parapharyngeal tumours are rare tumours of the head and neck where benign tumours are more common than malignant tumours. Most of the patients present with a neck mass[1,2,3]. The other symptoms reported are vague swallowing problems, incidental finding, previous tonsillectomy, upper airway obstruction, painful throat, unilateral tinnitus, trismus[1], dysarthria[3], glossopharyngeal neuralgia-asystole due to neural irritation[4] and cranial nerve palsies[5]. Pain, trismus or cranial nerve palsies often suggest malignancy[5]. FNAC is an important diagnostic tool to know the nature of the tumour (benign or malignant) and the origin of the tumour. This helps to plan the treatment modality of conservative surgery in benign and a more radical approach in malignant tumours. The non conclusive reports bring diagnostic dilemma, and the possibility of false positive results make treatment planning difficult. An ultrasound or CT scan guided FNAC may be attempted in such cases. Confirmation with a fresh frozen pathological diagnosis is ideal. FNAC was found reliable for diagnosis of *pleomorphic adenomas*[1]. In view of the above, a background of other investigations like sialogram and ultrasound besides a CT scan may occasionally aid planning of surgery. Sailogram is helpful in the early diagnosis of deep lobe tumours by identifying a space filling defect[6] and should be done in conjunction with CT scan to differentiate parotid from extraparotid tumours[7]. In the present series, CT scan was found to be most practical and informative diagnostic tool. Usually, the scan findings correlates well with the operative findings[2,8]. However, CT scan is not free of error even with expert interpretation. In the series of Carrau et al, CT scan correctly assessed tumours of salivary gland origin in 88%, misdiagnosed a minor salivary gland tumour and did not define origin in another[2]. In lesions larger than 4 cms in diameter, the fat plane between parotid and extraparotid salivary lesions is difficult to identify[7], making it difficult to determine the tumour origin i.e. minor salivary gland or parotid gland[5]. In these cases, transverse thin sections of T1 weighted MR images may prove useful. Occasionally, malignant parotid tumors, though rare, when small may appear identical to benign lesions[8]. Since glomus tumour, neuroma and minor salivary gland tumour have varied enhancement patterns with either a nonhomogenous or homogenous internal architecture, they are often indistinguishable[7]. In such cases angiography is said to yield a correct diagnosis.
In the present series, majority of the tumours were neurogenic accounting to 43.9%, salivary gland tumours were 34.15% and miscellaneous 21.95%. A similar finding is noted in a series of 51 cases by Carrau et al where 57% were neurogenic, 30% salivary gland tumours and 13% other tumours[2]. Contrary to this in some series[5,8,9,10,11], the salivary gland tumours outnumbered the neurogenic and other tumours. Rare tumours like synovial sarcoma[12], osteolipoma, meningioma[5] and malignant fibrous histiocytoma[1] as in our series have also been reported.

The surgical approach for excision of parapharyngeal tumour is predicted on several variables namely, prior knowledge of the histological diagnosis, goals regarding neural preservation, whether the tumour is amenable to embolisation and attempts at cure[3]. The intraoral approach has the advantage of no external scar, no mandibulotomy and no tracheotomy. Blind excision by this approach of a tumour as big as 5 - 6.5 cms has been reported[1]. In a series of 101 cases by McIlrath et al in which the intraoral approach was used in eight cases of neurogenic tumour, the external carotid artery was ligated prior to tumour excision in seven cases[11]. The intraoral approach has not been part of this study in view of the inherent dangers, but may be used in conjunction with the cervical or cervicoparotid approaches.

The cervical approach is preferred for poststyloid masses and transparotid approach for deep lobe parotid tumours[2]. Various surgeons have reported the use of cervical approach in most of their cases[5,13,14,15]. This was due to the fact that by this approach one finds good exposure, vascular control and access to surrounding structures but more importantly the reduced risk of post-operative complications. The cervicosubmaxillary approach, in which the submandibular salivary gland is removed or reflected superiorly to allow better access to the antero-inferior aspect of the parapharyngeal space, offers the same benefit as the cervical approach. The transcervical approach was employed in 58.5%, transcervicosubmaxillary in 17.1% and transparotid in 24.4% of cases in the series reported by Carrau et al[2] which in our series is 51.9%, 14.8% and 33.3% respectively. The commonest approach used have been the cervical approach.

A mandibulotomy may be done following the cervical or cervicoparotid approaches where exposure or access is difficult. A mandibulotomy has been advocated for extensive tumours[5], those that require a radical approach[1] and for malignant tumours[1,16]. It has also

been indicated for large or highly vascular extraparotid tumours particularly those extending to skull base[16]. Olsen K.D. finds mandibulotomy necessary in only 10% of cases[5]. Though mandibulotomy may not been required for tumour as large as 11x9x9 cms[1], however, the removal of large tumours without division of the mandible remains a blind procedure which increases the possibility of tumour rupture and spillage in an inaccessible area[17].

Most of the osteotomies that have been described are sited at the angle or body of the mandible and have the disadvantage of sectioning the inferior alveolar nerve. The need for mandibulotomy has overcome the limitation of this nerve sectioning as the nerve function returns to normal in most cases within one year[18]. The post operative complications are most commonly reported in the tumours of neurogenic origin. Though meticulous dissection may be done for these tumours it may not be possible to preserve the nerve if it is too thin or splayed out. Complications due to severance of nerves like vagus nerve[5,15], spinal accessory nerve[2,19], hypoglossal nerve[5,20] and cervical sympathetic chain[14] have been reported. The cut end of the spinal accessory nerve may be sutured[5]. Greater auricular nerve grafting of the severed nerve gives good results except for cervical sympathetic chain. It is said that Horner's syndrome is a frequent postoperative sequelae in the treatment of schwannoma of cervical sympathetic chain despite preservation of the sympathetic chain and this neurological impairment is usually asymptomatic[14]. In the present series, post-operative complications of aspiration, hoarseness and dysphagia seen in one case of malignant paraganglioma has been treated with vocal cord medialisation and cricopharyngeal myotomy after one year of conservative treatment with good results.

Conclusion

It is prudent for the surgeon to adopt that approach with less tissue and nerve manipulation, which does not compromise exposure and tumour accessibility. FNAC is a cost-effective investigation, which can help determine the surgical approach based on origin and nature of the tumour. More importance is given to the cervical approach due to it's flexibility and no facial nerve manipulation. The cervicoparotid approach is most appropriate for deep lobe parotid tumours. Mandibulotomy is the best option where access is limited but is not a prerequisite for tumour removal. Complications are mainly due to the nature and the type of tumour and are more common in the tumours of neurogenic origin. However, inadequate surgical exposure may also be a risk factor in injuring the vital structures. Hence, proper selection of the surgical approach is very much advisable.

References

1. Allison RS, Van Der Waal I, Snow GB: Parapharyngeal tumours a review of 23 cases. Clin Otolaryngol 1989; 14: 199-203.
2. Carrau RL, Myers EN, Johnson JT: Management of tumours arising in the parapharyngeal space. Laryngoscope 1990; 100: 583-89.
3. Pensak ML, Gluckman JL, Shumrick KA. Parapharyngeal space tumours: An algorithm for evaluation and management. Laryngoscope 1994; 104: 1170-173.
4. Sobol SM, Wood BG, Conoyer JM: Glossopharyngeal neuralgia - Asystole syndrome secondary to parapharyngeal space lesions. Otolaryngol Head Neck Surg 1982; 90(1): 16-19.
5. Olsen KD: Tumours and surgery of the parapharyngeal space. Laryngoscope 1994; 104: 1-27.
6. Baker DC, Conley J: Surgical approach to retromandibular parotid tumours. Ann Plastic Surgery 1979; 3(4): 304-14.
7. Som PM, Sacher M, Stollman AL, Biller HF, Lawson W: Common tumours of the parapharyngeal space: Refined imaging diagnosis. Radiology 1988; 169: 81-85.
8. Carr RJ, Bowerman JE: A review of the tumours of the deep lobe of the parotid salivary gland. Br J Oral Maxillofac Surg 1986; 24: 154-68.
9. McIlrath DC, ReMine WH: Parapharyngeal tumours. Surg Clin North Am 1963; 43: 1041-47.

10. Maran AGD, Mackenzie IJ, Murray JAM: The parapharyngeal space. J Laryngol Otol 1984; 98: 371-80.

11. McIlrath DC, ReMine WH, Devine KD, Dockerty MB: Tumours of parapharyngeal region. Surg, Gynecol Obstet 1963; 116: 88-94.

12. Hazarika P, Shah P, Pujary K, Balakrishnan R: Synovial sarcoma of the head and neck. A report of three cases. Indian Journal of Otolaryngology Head and Neck Surgery 1999; 51(4): 36-41.

13. Bass RM: Approaches to the diagnosis and treatment of the tumours of the parapharyngeal space. Head Neck Surg 1982; 4(4): 281-89.

14. Myssiorek DJ, Silver CE, Valdes ME: Schwannoma of the cervical sympathetic chain. J Laryngol Otol 1988; 102: 962-65.

15. Kumar A, Hazarika P, Kapadia RP: Neurogenic tumours of the parapharyngeal space in the paediatric age group. Int J Pediatr Otolaryngol 1991; 22: 195-200.

16. Som PM, Biller HF, Lawson W: Tumours of the parapharyngeal space: Preoperative evaluation, diagnosis and surgical approaches. Ann Oto Rhino Laryngol 1981; 90: 13-15.

17. Flood TR, Hislop WS: A modified surgical approach for parapharyngeal space tumours: use of the inverted "L" osteotomy. Br J Oral Maxillofac Surg 1991; 29: 82-86.

18. Pinsolle J, Siberchicot F, Emparanza A, Caix P, Michelet FX: Approach to the pterygomaxillary space and posterior part of the tongue by lateral stair-step mandibulotomy. Arch Otolaryngol 1989; 115: 313-15.

19. Gore DO, Rankow R, Hanford JM: Parapharyngeal neurilemmoma. Surg, Gynecol Obstet 1956; 103: 193-201.

20. McCurdy JA, Hays LL, Johnson GK: Parapharyngeal neurilemmoma of the hypoglossal nerve. Laryngoscope 1976; 86(5): 724-27.