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Management of accessory parotid gland tumours: 32-year experience from a single institution and review of the literature☆

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Abstract. Accessory parotid gland tumours (APGTs) are very rare. Regarding their anatomical location, an adequate surgical approach is necessary to provide safe resection and satisfactory postoperative results. The aims of this study were to present our tertiary centre experience in surgical treatment and management of APGTs and to review the literature regarding their treatment, particularly in terms of surgical modalities. Data of 13 patients with primarily surgically treated APGTs have been collected and analysed. Well-documented English-literature articles of surgically treated APGTs have been extracted from the PubMed, Scopus and Web of Science databases ending in May 2018, and analysed. Mean age at diagnosis was 41.1 years. The most common benign histological subtype was pleomorphic adenoma (53.8%), while mucoepidermoid carcinoma (23.1%) was most common in malignant counterparts. The malignancy rate was 38.5%. Postoperative results were satisfactory, and the follow-up period was uneventful in all patients except one who died of locoregional recurrence. A total of 57 papers with reported series in APGTs have been identified with a total of 306 APGT cases. From oncological, functional and aesthetic standpoints, approaches through a standard parotidectomy provide satisfactory results.

Key words: accessory parotid gland tumours; salivary gland tumours; surgical treatment; parotidectomy; facial nerve.

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The accessory parotid gland is an isolated cluster of salivary tissue which lies between the buccal and zygomatic branches of the facial nerve on the masseter muscle. It occurs typically around the midpoint of an imaginary line drawn from the tragus of the ear to a point halfway between the alae of the nose and the vermillion boarder of the upper lip[1]. Despite the incidence of accessory parotid gland being reported to be 21–56% among human cadavers[2,3], tumours originating from accessories are

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extremely rare and constitute 1–7.7% of all parotid gland tumours[1,4]. The reported malignancy rate of accessory parotid gland tumours (APGTs) is higher than tumours in the parotid, ranging from 26% to 50%[4,5].

The mainstay of treatment of APGTs is surgical resection. Surgical treatment includes preservation of anatomical structures related to the affected region, while respecting oncological principles. Preservation of the facial nerve is the most important aspect in surgical treatment. The selection of an optimal approach used in the surgical treatment of APGT is the subject of the discussion. The most frequently utilized include approaches through the standard parotidectomy incision, facelift incision, and direct transcutaneous or transoral incisions. Recent reports presented the minimally invasive endoscopic-assisted surgery as an alternative method in the treatment of APGT[6–9].

The aims of this study were to present our tertiary centre's experience in surgical treatment and management of APGT and to review the literature regarding its diagnostics, work-up and treatment, particularly in terms of surgical modalities.

Materials and methods

Patients

Data were collected retrospectively from the institutional salivary tumours database for the period between 1 January 1985 and 31 December 2016 at the Department of Maxillofacial Surgery, University Hospital Dubrava, Zagreb. Patients with APGTs who were primarily surgically treated, were included in the study. Mid-cheek masses other than APGTs were excluded from further analysis. The follow-up interval was calculated in months from the date of a first treatment to the date of a last follow-up or death. The follow-up period was concluded on 31 December 2017.

Well-documented English-literature articles of surgically treated APGTs have been extracted from the PubMed, Scopus and Web of Science databases ending in May 2018, and analysed. The search strategy used a key word 'accessory parotid gland tumors'. The search was performed independently by two reviewers (M.M. and P.S.).

Per the institutional review board of the University Hospital Dubrava, Zagreb, this study met criteria for non-human subject research, and as a result, board approval was not required.

Treatment

Preoperative evaluation included careful physical examination, ultrasound-guided fine-needle aspiration cytology (US-guided FNAC), and multi-slice computed tomography (MSCT) or magnetic resonance imaging (MRI) (Fig. 1). After the diagnosis of APGT was established, surgical management was conducted through a standard parotidectomy incision (modified Blair incision) or facelift incision (Fig. 2). After elevation of the anterior skin flap, initial tracing of the facial nerve main trunk introducing anterograde dissection of its branches was performed (Fig. 3). Following identification of the zygomatic and buccal branches, excision of the accessory parotid gland with concurrent superficial parotidectomy was carried out. Superselective or selective neck dissections were carried out in the cases with preoperative assessed malignant tumour. Postoperative radiation therapy (PORT) was conducted in cases of high-grade tumours or advanced-stage

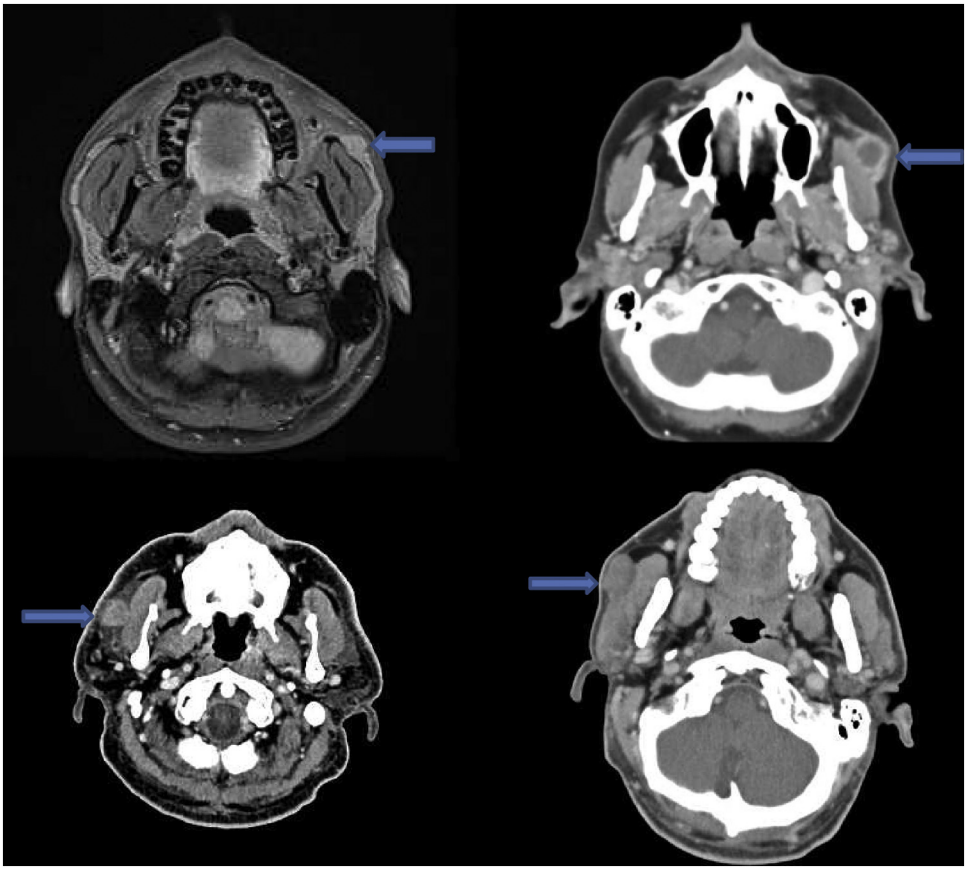

Fig. 1. Magnetic resonance imaging and multi-slice computed tomography scans of patients with accessory parotid gland tumours. Arrows point to the tumour.

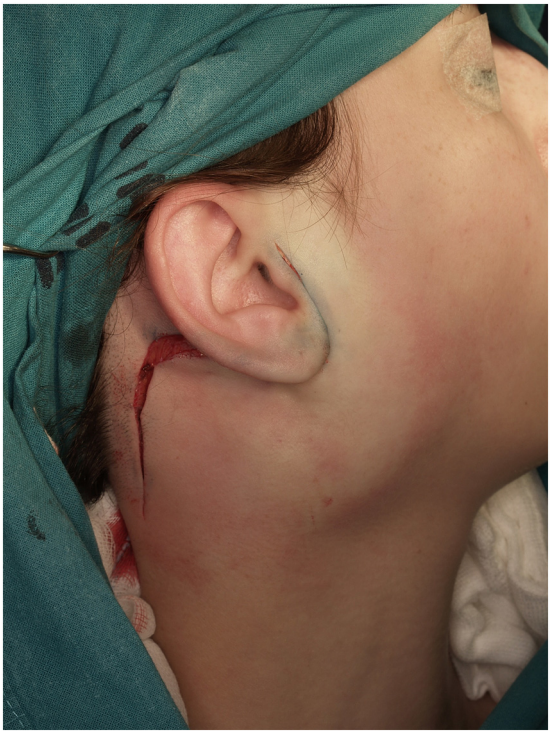

Fig. 2. Facelift approach skin incision.

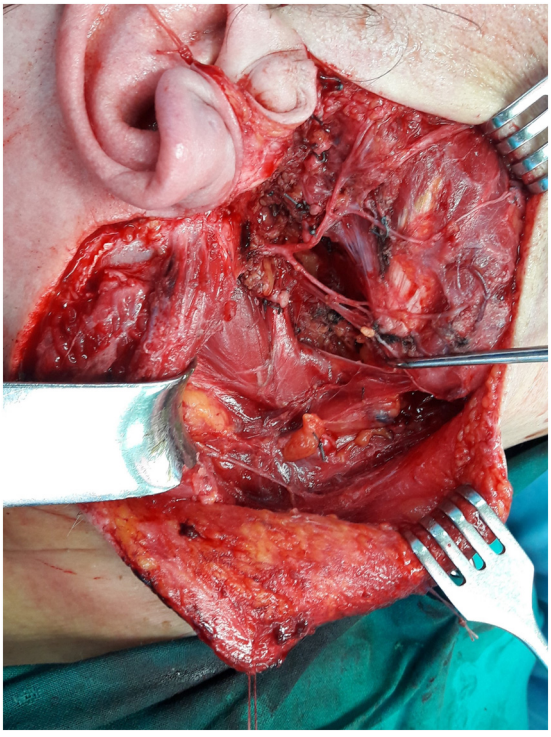

Fig. 3. Intraoperative view.

disease. With daily fractions of 2 Gy, a prophylactic dose of 50 Gy to clinically undissected neck levels was given, with a boost of 60 Gy to the tumour bed and metastases confined to lymph nodes. The follow-up protocol consisted of medical history and physical examination every 3, 6, 8 and 12 months, in the first, second, third and fourth years of follow-up, respectively.

Results

During the 32-year period, 792 patients with parotid gland tumour were primarily surgically treated at our institution. Accessory parotid gland tumours comprised 1.64% of all surgically treated parotid gland tumours (13/792). Clinical features of the study group are summarized in Table 1. Mean age at the diagnosis of APGT was 41.1 (range, 15-70) years. A total of 53.8% (n = 7) patients were male and 46.2% (n = 6) were female. Mean age of patients with benign tumours was 40 years, while in malignant counterparts it was 43 years. Tumours arising in accessory parotid gland presented a malignancy rate of 38.5% (5/13). The most common benign histological subtype was pleomorphic adenoma (PA) (53.8%), followed by myoepithelioma (7.5%). Among malignant tumours the most common subtype was mucoepidermoid carcinoma (MEC) (23.1%), followed by carcinoma ex-PA (7.5%) and adenoid cystic carcinoma (7.5%).

Eleven patients (84.6%) were treated primarily surgically, while two patients (15.4%) were referred to our institution due to local recurrence of PA after previous treatment in other institutions (both treated using transcutaneous incision). In two cases (15.4%), final histopathological diagnosis was non-consistent with preoperative FNAC diagnosis (MEC misdiagnosed as lymphoepithelial cyst and carcinoma ex-PA misdiagnosed as skin adnexal carcinoma). Four patients with malignant disease underwent concurrent neck dissection, two of which were therapeutic. Three patients underwent superselective dissection of region II, while one was treated with selective neck dissection of levels I–III. Twelve accessory parotidectomies entailed a superficial parotid lobectomy, while one entailed a total parotidectomy with composite resection of the masseter muscle (case of high-grade MEC). In two patients a lymph node within the superficial parotid lobe was involved by APGT metastasis, while in 11 patients the parotid was tumour free. One patient with a positive intraparotid lymph node had a positive neck dissection specimen (case of high-grade MEC). Two patients had a positive neck without involvement of the superficial lobe of the parotid gland, with one dissection being elective. In four cases of superficial parotidectomy, buccal and/or zygomatic branches were in close relation with the APGT and were sacrificed in order to achieve tumour clearance. Apart from patients in whom peripheral branches

Table 1. Clinical features of the study group.

Patient no.	Age (years)/sex	Presence of mass (months)	Symptoms	Size (cm)	FNAC	PHD	Management	Outcome
1.	14/M	3	Cheek swelling, pain mass	3.0 × 1.0	MEC	MEC, HG	SPI, total parotidectomy, superselective ND (II), PORT	DOD
2.	48/F	12	Firm, asymptomatic and progressively enlarging mass	Multinodular	PA	PA	SPI, superficial parotidectomy	NED
3.	70/M	216	Firm, asymptomatic and progressively enlarging mass	3.0 × 2.0	PA	PA	SPI, superficial parotidectomy	NED
4.	67/M	36	Firm, progressively enlarging, pain mass	3.0 × 2.5	AdCC	AdCC	SPI, superficial parotidectomy, superselective ND (II), PORT	NED
5.	15/F	24	Firm, asymptomatic and progressively enlarging mass	1.2 × 1.0	Myoepithelioma	Myoepithelioma	FLI, superficial parotidectomy	NED
6.	20/F	24	Painless mass, numbness of cheek and upper lip	1.7 × 1.7	PA	PA	FLI, superficial parotidectomy	NED
7.	57/M	10	Firm, asymptomatic and progressively enlarging mass	1.6 × 1.0	PA	PA	SPI, superficial parotidectomy	NED
8.	41/M	36	Firm, asymptomatic and progressively enlarging mass	2.5 × 2.0	PA	PA	FLI, superficial parotidectomy	NED
9.	29/M	12	Firm, asymptomatic and progressively enlarging mass	2.6 × 2.2	PA	PA	SPI, superficial parotidectomy	NED
10.	30/M	6	Firm, asymptomatic and progressively enlarging mass	0.8 × 0.8	MEC	High-grade MEC	FLI, superficial parotidectomy, PORT, superselective ND (II)	NED
11.	38/F	6	Firm, asymptomatic and progressively enlarging mass	Multinodular	Lymphoepithelial cyst	Low-grade MEC	FLI, superficial parotidectomy	NED
12.	66/F	420	Cheek swelling, pain mass in last 20 days	2.0 × 1.8	Skin adnexal carcinoma	Carcinoma ex-PA	SPI, superficial parotidectomy, SND (I–III), PORT	NED
13.	39/F	6	Firm, asymptomatic and progressively enlarging mass	Multinodular	PA	PA	SPI, superficial parotidectomy	NED

AdCC, adenoid cystic carcinoma; DOD, died of disease; FLI, facelift incision; FNAC, fine-needle aspiration cytology; MEC, mucoepidermoid carcinoma; ND, neck dissection; NED, no evidence of disease; PA, pleomorphic adenoma; PHD, histopathogical diagnosis; PORT, postoperative radiation therapy; SND, selective neck dissection; SPI, superficial parotidectomy incision.

were sacrificed, two patients (22.2%) developed transient facial nerve palsy.

Four patients with malignant tumours underwent PORT. At the time of follow-up, all patients were disease-free, except one with MEC who developed a locoregional recurrence 8 months after initial treatment and died 6 months later. At 5 years, overall survival was 92.3%. Mean follow-up was 69 months (range 14–220 months).

Extracted data from the literature of surgically treated APGTs are summarized in Table 2.

Discussion

Tumours of the accessory parotid gland are rare and the literature usually depends on individual case reports and limited case series. A total of 57 papers focusing on APGTs have been identified with a total of 306 APGT cases[1–4,6–58]. The series of patients presented in this study is an updated report, previously published by the senior author[10]. To our knowledge, this is the largest European series of APGTs treated at a single institution, and the fifth largest published in the English literature overall[1,4,11,12].

The neoplasms located in accessory parotid tissue usually present as slow-growing, painless, mid-cheek masses. Evaluation of a mass in the mid-cheek region can be a difficult task. Lesions in this area may arise from any number of the soft tissues of the face, including skin, lymphatic, adnexal, neurogenic and salivary structures. Differential diagnoses of this area include parotid gland cyst or arteriovenous malformation, Stensen's duct lesion (stone, cyst or tumour), adenexal and neural tumours, hemangioma, haematoma, benign and malignant adenopathy (salivary carcinoma, lymphoma, sarcoma), metastasis (cutaneous squamous cell carcinoma, melanoma, adenocarcinoma) and APGTs.

In most studies, the age of APGT occurrence ranges between 45 and 64 years[12–15]. Conversely, in our study patients were younger with a mean age of 41 years. In our series, the most frequent histopathological subtype of benign APGT was PA, while the most common malignant subtype was MEC. A similar pattern of distribution with respect to histological subtype has been published in the literature[1,4,12], except the study by Ma in which the most common malignant subtype was lymphoma, followed by lymphoepithelial carcinoma and acinic cell carcinoma[11].

Table 2. Review of the published cases of accessory parotid gland tumours.

APGT	*N* (306)	n	%
Benign	218		71.2
PA		135	61.9
Myoepithelioma		11	5.1
Basal cell adenoma		11	5.1
Hemangioma		11	5.1
Lymphoepithelial lesion		11	5.1
Fibroma		9	4.1
Others		30	13.6
Malignant	88		28.8
MEC		30	34.1
Lymphoma		10	11.4
Acinar cell carcinoma		8	9.1
Lymphoepithelial carcinoma		8	9.1
AdCC		6	6.8
Carcinoma ex-PA		5	5.7
Others		21	23.8

Traditional surgery approaches	*N* (237)	%
Standard parotidectomy	201	84.8
Direct transcutaneous	16	6.8
Transoral	13	5.5
Facelift	5	2.1
Weber–Ferguson	1	0.4
Lip-split	1	0.4

Endoscopicaly assisted surgery approaches	*N* (24)	%
Transcutaneous	23	95.8
Transoral	1	4.2

AdCC, adenoid cystic carcinoma; APGT, accessory parotid gland tumour; MEC, mucoepidermoid carcinoma; PA, pleomorphic adenoma.

The incidence of APGT among all parotid tumours primary surgically treated at our institution was 1.64% with a malignancy rate of 38.5% and this is consistent with previous publications[1,4,11].

According to the pooled data extracted from all available studies, the malignancy rate of APGT is 28.8% (88/306). In our study, the 5-year overall survival rate for all patients with APGT was 92.3%, while patients with malignant APGT had a survival rate of 80% in the same time interval. One patient (MEC) developed locoregional recurrence and died due to disease recurrence. While other series reported a favourable outcome in terms of survival and recurrence among benign tumours, data related to survival of malignant tumours have not been reported.

Pretreatment cytological and radiological findings were the main factors for determining the extent of surgical treatment. In two cases FNAC was not consistent with definitive histopathological diagnosis presenting preoperative diagnostic sensitivity of 84.6% (two initially benign tumours were later deemed malignant in the definitive histological report). In the first patient (no. 11) the diagnosis of MEC on final histopathological report was preoperatively described as a lymphoepithelial cyst, while in second patient (no. 12) carcinoma ex-PA was described as a skin adnexal carcinoma (Table 1). The FNAC of low-grade MEC is well recognized for its potential false-negative diagnostic pitfall, due to the bland cytological features and hypocellular nature of this histological subtype[59,60]. The differential diagnosis of low-grade MEC includes Warthin tumour, benign salivary gland cysts (lymphoepithelial cysts), branchial cleft cyst, sialolithiasis or chronic sialadenitis complicated by cystic dilatation, and PA with excess mucoid stroma[61,62]. Hughes et al. reported that the diagnostic accuracy of FNAC decreased to 48%, with a sensitivity of 73% in detection of malignant and 91% in benign parotid gland tumours[63]. In this study, the benefit of using US-guided FNAC was demonstrated in a patient (no. 12) with carcinoma ex-PA in which US-guided FNAC showed neck metastasis in region II, previously unsuspicious on physical examination and MSCT (Table 1). Although in this case FNAC was not consistent with definitive histopathological diagnosis, positive neck lymph node consequently affected planning of the surgery. Given the fact that US-guided FNAC offers additional information regarding enlarged lymph nodes and malignancy in small lymph nodes not identified by other methods, it can be recommended as part of preoperative work-up for most salivary gland tumours, which is supported by the literature[64–66].

The mainstay of treatment for APGT is surgical excision. However, selection of an optimal approach and the extent of treatment is the subject of debate. Except for one case (no. 1), all other cases entailed concurrent superficial parotidectomy (Table 1). Although it is unnecessary for the management of benign APGT, it was performed to allow better access to APGT. Moreover, considering preoperative inconsistency with definitive histopathological report, superficial parotidectomy may provide an extra margin in oncological terms. The optimal surgical approach should provide safe access to the tumour, flexibility and easy manipulation. Also, of significant importance is a satisfying aesthetic result. The treatment procedures reported in the literature consisted of traditional surgery (90.8%) and endoscopic-assisted surgical techniques (9.2%) (Table 2). Approaches used in both of these procedures were external (transcutaneous) and transoral. The discrepancy between the total number of APGTs (n = 305) and the total number of reported approaches (n = 261) in Table 2 stems from the lack of information with respect to treatment modalities in published articles.

Surgical approaches used in the present study were the standard parotidectomy incision (61.5%) and facelift incision (38.5%) (Fig. 2). Both approaches provide optimal visibility of APGT and surrounding structures (Fig. 3). Wide operative field allows flexibility and safe dissection of the facial nerve trunk with tracing of all its branches and parotid duct. Postoperatively, apart from four patients in whom the buccal branches were sacrificed in order to achieve macroscopic tumour clearance, only two (15.4%) patients developed transitory facial nerve palsy. No case of salivary fistula or gustatory sweating syndrome was noted. The postoperative scars were hidden in the cervical crease and hair-bearing portion of the scalp providing a satisfying aesthetic result in all patients (Fig. 4). The facelift approach is considered as the gold standard in facial rejuvenation, thus from the aesthetic standpoint, its use in oncological surgery is highly acceptable. Interestingly, a very low rate (2.1%) of facelift incisions has been reported according to the reviewed literature (Table 2). One possible reason for this could be inexperience in the treatment of such a rare tumour

Fig. 4. Postoperative view (14 months after surgery with facelift approach).

through a generally considered aesthetic approach. The preference of using an approach through standard parotidectomy incision was reported by Perzik and White, presenting 20 patients without facial nerve injury and good aesthetic results[1]. Other authors reported similar outcomes[15–18]. Both standard parotidectomy and facelift approaches permit frozen sectioning and easy conversion into neck dissection if necessary. These approaches are also appropriate in clinically positive lymph node settings.

The direct approach through transcutaneous mid-cheek incision reduces damage to the surrounding tissue and shortens the duration of treatment. In our opinion, this approach should be reserved for experienced surgeons, due to high risk of injury to the facial nerve[4]. The chance of damaging peripheral branches and Stensen's duct may be increased up to 40%, as reported[4]. Other potential complications include seeding of the tumour, development of a salivary fistula and local recurrence[4,13].

The main advantages of the direct transoral approach are no visible scars and time saving compared to the standard parotidectomy incision[14,19–21]. However, it is limited to cases of small-sized tumours located more anteriorly, which reduces the risk of Stensen's duct or facial nerve impairment[14]. Its disadvantage is reduced operative viewing field implicating difficulties in manipulation and bleeding control[13,17]. For these reasons, the direct transoral approach has been described as 'ill-advised'[17]. Some authors used a nerve monitor to identify small nerve branches[21,22]. Even though the monitor indicates when the surgeon is near the nerve, it does not guarantee visualization, and a routine visualization is therefore recommended[22].

In recent years, endoscopic-assisted surgery has become more frequent in the head and neck. There are few reports on endoscopic-assisted treatment of APGTs[6–9]. Xie et al. first described such a technique in a series of five patients via a 4- to 5-cm preauricular incision and assistance of working space-maker[6]. Li et al. modified the previously mentioned approach with shorter and less visible skin incisions[7]. However, in all series of transcutaneous endoscopic procedures, only benign APGTs less than 3.2 cm in size were included[6–8]. To date, only one case of transoral endoscopic-assisted resection of APGT has been described[9]. The advantages of endoscopic-assisted surgery over traditional surgery include reduced tissue damage, low incidence of wound-related complications and minimal scarring. The endoscope provides sufficient illumination and magnification of the operative field[6,8]. Postoperatively, no case of facial nerve palsy, infection, salivary fistula, gustatory sweating syndrome or local recurrence has been noted, all reporting satisfactory cosmetic results[6–9]. The follow-up periods varied between 2 and 14 months. On the contrary, disadvantages of endoscopic-assisted surgery are inability to operate large and malignant tumours, reservation for trained professionals in endoscopic techniques and a time-consuming procedure which is difficult to compare with traditional surgery due a small case series[6–8]. Furthermore, discrepancies between preoperative FNAC and definitive histopathological diagnosis can lead to inadequate resection of an APGT initially considered to be benign, if using an endoscopic approach. Additionally, primarily due to oncological reasons, the feasibility of endoscopic-assisted surgery of benign APGT is questionable. This opinion is supported by previous studies which reported reduced recurrence rates (less than 4%) associated with extended surgical technique compared to high incidence of recurrence (25–40%) following enucleation of the parotid gland PA[67–69]. Two patients referred to our institution due to local recurrence after previous treatment of PA using direct transcutaneous approach, also support the importance of adequate tumour resection. The re-operation carries a higher risk of facial nerve injury and local recurrence which varies from 15 to 30% and from 15 to 75%, respectively[70–73]. Moreover, since recurrent tumours of the parotid occur 3–9 years after initial surgical treatment, short follow-up in cases of endoscopic-assisted resection studies is not sufficient for recurrence detection and analysis of true recurrence rates[71,73]. Endoscopic-assisted approaches may be considered as an alternative in the treatment of small benign APGTs, but larger series with an updated and mature follow-up period are needed in order to utilize its full potential in APGT treatment.

Accessory parotid gland tumours are very rare, but should be considered in the differential diagnosis of a mid-cheek mass. According to our results, patients with APGTs were younger than other authors reported. Detailed diagnostics and pretreatment work-up are needed in order to avoid misdiagnosis and undertreatment. Approaches through standard parotidectomy and facelift incision are recommended for surgical treatment of APGT, with minimally invasive techniques being reserved for benign subtypes. Although series of malignant APGTs are limited, the survival is favourable. Further investigations and large prospective and

multicentre trials are needed in order to define optimal extent of surgery as well as adjuvant treatment modalities.

Declarations

The following additional information is required for submission. Please note that failure to respond to these questions/statements will mean your submission will be returned to you. If you have nothing to declare in any of these categories then this should be stated.

Ethical approval

The Ethics Board of University Hospital Dubrava decided that ethical approval was not required because all involved in this study signed written patient consent forms.

Patient consent

Written patient consent was obtained.

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Competing interests

The authors have no competing interests.

References

1. Perzik S, White I. Surgical management of preauricular tumors of the accessory parotid apparatus. *Am J Surg* 1966;**112**(4):498–503.
2. Frommer J. The human accessory parotid gland: its incidence, nature, and significance. *Oral Surg Oral Med Oral Pathol* 1977;**43**(5):671–6.
3. Toh H, Kodama J, Fukuda J, Rittman B, Mackenzie I. Incidence and histology of human accessory parotid glands. *Anat Rec* 1993;**236**(3):586–90.
4. Johnson F, Spiro R. Tumors arising in accessory parotid tissue. *Am J Surg* 1979;**138**(4):576–8.
5. Guzzo M, Locati LD, Prott FJ, Gatta G, McGurk M, Licitra L. Major and minor salivary gland tumors. *Crit Rev Oncol Hematol* 2010;**74**(May (2)):134–48. http://dx.doi.org/10.1016/j.critrevonc.2009.10.004.
6. Xie L, Zhang D, Lu MM, Gao BM. Minimally invasive endoscopic-assisted resection of benign tumors in the accessory parotid gland: 5 case studies. *Head Neck* 2012;**34**(8):1194–7.
7. Li B, Zhang L, Zhao Z, Shen G, Wang X. Minimally invasive endoscopic resection of benign tumours of the accessory parotid gland: an updated approach. *Br J Oral Maxillofac Surg* 2013;**51**(4):342–6.
8. Zhang DM, Wang YY, Liang QX, Song F, Chen WL, Zhang B. Endoscopic-assisted resection of benign tumors of the accessory parotid gland. *J Oral Maxillofac Surg* 2015;**73**(8):1499–504. http://dx.doi.org/10.1016/j.joms.2015.01.032.
9. Woo S. Endoscope-assisted transoral accessory parotid mass excision. *Head Neck* 2016;**38**(1):E7–12.
10. Luksic I, Suton P, Rogic M, Dokuzovic S. Accessory parotid gland tumours: 24 years of clinical experience. *Int J Oral Maxillofac Surg* 2012;**41**(12):1453–7.
11. Ma H, Jin S, Du Z, Wang L, Zhang Z, Wang Y. Pathology and management of masses in the accessory parotid gland region: 24-year experience at a single institution. *J Craniomaxillofac Surg* 2018;**46**(2):183–9.
12. Yang X, Ji T, Wang LZ, Yang WJ, Hu YJ, Zhong LP, Zhang CP, Zhang ZY. Clinical management of masses arising from the accessory parotid gland. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011;**112**(3):290–7.
13. Klotz DA, Coniglio JU. Prudent management of the mid-cheek mass: revisiting the accessory parotid gland tumor. *Laryngoscope* 2000;**110**(10 Pt 1):1627–32.
14. De Riu G, Meloni SM, Massarelli O, Tullio A. Management of midcheek masses and tumors of the accessory parotid gland. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011;**111**(5):e5–11.
15. Lin DT, Coppit GL, Burkey BB, Netterville JL. Tumors of the accessory lobe of the parotid gland: a 10-year experience. *Laryngoscope* 2004;**114**(9):1652–5.
16. Choi HJ, Lee YM, Kim JH, Tark MS, Lee JH. Wide excision of accessory parotid gland with anterior approach. *J Craniofac Surg* 2012;**23**(1):165–8.
17. Polayes IM, Rankow RM. Cysts, masses, and tumors of the accessory parotid gland. *Plast Reconstr Surg* 1979;**64**(1):17–23.
18. Dell' Aversana Orabona G, Abbate V, Piombino P, Iaconetta G, Califano L. Midcheek mass: 10 years of clinical experience. *J Craniomaxillofac Surg* 2014;**42**(7):e353–8.
19. Kaneko K, Kanai R. Cavernous hemangioma of the accessory parotid gland. *J Craniofac Surg* 2011;**22**(6):e28–9.
20. Tsegga TM, Britt JD, Ellwanger AR. Pleomorphic adenoma of the accessory parotid gland: case report and reappraisal of intraoral extracapsular dissection for management. *J Oral Maxillofac Surg* 2015;**73**(3):564–70.
21. Schmutzhard J, Schwentner IM, Andrle J, Gunkel AR, Sprinzl GM. Resection of accessory parotid gland tumors through a peroral approach with facial nerve monitoring. *J Craniofac Surg* 2007;**18**(6):1419–21.
22. Newberry TR, Kaufmann CR, Miller FR. Review of accessory parotid gland tumors: pathologic incidence and surgical management. *Am J Otolaryngol* 2014;**35**(1):48–52.
23. Jung YH, Hah JH, Sung MW, Kim KH. Parotidotomy approach for a midcheek mass: a new surgical strategy. *Laryngoscope* 2010;**120**(3):495–9.
24. Lewkowicz A, Levy Y, Zeltser R, Zagury A, Nahlieli O. Accessory parotid gland masses. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000;**89**(5):610–2.
25. Osborne RF, Purohit MR, Hamilton JS. Pleomorphic adenoma of the accessory parotid gland. *Ear Nose Throat J* 2005;**84**(5):274–5.
26. Ramachar SM, Huliyappa HA. Accessory parotid gland tumors. *Ann Maxillofac Surg* 2012;**2**(1):90–3.
27. Sun G, Hu Q, Tang E, Yang X, Huang X. Diagnosis and treatment of accessory parotid-gland tumors. *J Oral Maxillofac Surg* 2009;**67**(7):1520–3.
28. Rodino W, Shaha AR. Surgical management of accessory parotid tumors. *J Surg Oncol* 1993;**54**(3):153–6.
29. Chang CH, Mun GH, Lim SY, Hyon WS, Bang SI, Oh KS. Cavernous vascular tumor of the accessory parotid gland. *J Craniofac Surg* 2007;**18**(6):1493–6.
30. Kakuki T, Takano K, Kurose M, Kondo A, Okuni T, Ogasawara N, Himi T. Accessory parotid gland tumors: a series of 4 cases. *Ear Nose Throat J* 2016;**95**(7):E35–8.
31. Das S, Nayak UK, Buggavetti R, Sekhar S. Adenoid cystic carcinoma of accessory parotid gland: a case report. *J Oral Maxillofac Surg* 2016;**74**(5):1097. e1–..
32. Funamura JL, Aouad RK, Ramsamooj R, Donald PJ. Salivary duct carcinoma of the accessory parotid gland. *Otolaryngol Head Neck Surg* 2013;**149**(2):347–8.
33. Al-Hashim MA, Al-Jazan NA. Salivary duct carcinoma of accessory parotid. *J Fam Community Med* 2017;**24**(3):200–2. http://dx.doi.org/10.4103/jfcm.JFCM_141_16.
34. Baklacı D, Güngör V, Özcan M, Yılmaz YF, Ünal A, Çolak A. Adenoid cystic carcinoma of the accessory parotid gland. *Kulak Burun Bogaz Ihtis Derg* 2015;**25**(5):302–5. http://dx.doi.org/10.5606/kbbihtisas.2015.45467.
35. Yang T, Gu Y, Zhang L, Hua Z. Congenital tri-cavernous hemangiomas of the right buccal region, right accessory parotid gland, and masseter muscle region. *J Craniofac Surg* 2014;**25**(2):678–80. http://dx.doi.org/10.1097/SCS.0000000000000501.
36. Iguchi H, Yamada K, Yamane H, Hashimoto S. Epithelioid myoepithelioma of the accessory parotid gland: pathological and magnetic resonance imaging findings. *Case Rep Oncol* 2014;**2**:310–5. http://dx.doi.org/10.1159/00036309.
37. Seith AB, Gadodia A, Sharma R, Parshad R. Unilateral parotid agenesis associated with pleomorphic adenoma of ipsilateral accessory parotid gland. *Ear Nose Throat J* 2013;**92**(1):E13–5.
38. Levine P, Fried K, Krevitt LD, Wang B, Wenig BM. Aspiration biopsy of mammary

analogue secretory carcinoma of accessory parotid gland: another diagnostic dilemma in matrix-containing tumors of the salivary glands. *Diagn Cytopathol* 2014;**42**(1):49–53. http://dx.doi.org/10.1002/dc.22886.
39. Nakatsuka S, Harada H, Fujiyama H, Takeda K, Kitamura K, Kimura H, Nagano T, Ito M, Asada Y. An invasive adenocarcinoma of the accessory parotid gland: a rare example developing from a low-grade cribriform cystadenocarcinoma? *Diagn Pathol* 2011;**6**:122. http://dx.doi.org/10.1186/1746-1596-6-122.
40. Colella G, Apicella A, Bove P, Rossiello L, Trodella M, Rossiello R. Oncocytic carcinoma of the accessory lobe of the parotid gland. *J Craniofac Surg* 2010;**21**(6):1987–90. http://dx.doi.org/10.1097/SCS.0b013e3181f503d9.
41. Koudounarakis E, Karatzanis A, Nikolaou V, Velegrakis G. Pleomorphic adenoma of the accessory parotid gland misdiagnosed as glomus tumour. *JRSM Short Rep* 2013;**4**(3):23. http://dx.doi.org/10.1177/2042533313476693.
42. Gomes M, Pepe G, Bomanji J, Al-Salihi O, Du Y, Gacinovic S, Ell P. High-grade mucoepidermoid carcinoma of the accessory parotid gland with distant metastases identified by 18F-FDG PET-CT. *Pediatr Blood Cancer* 2008;**50**(2):395–7.
43. Tamiolakis D, Chimona TS, Georgiou G, Proimos E, Nikolaidou S, Perogamvrakis G, Papadakis CE. Accessory parotid gland carcinoma ex pleomorphic adenoma. Case study diagnosed by fine needle aspiration. *Stomatologija* 2009;**11**(1):37–40.
44. Breeze J, Ramesar K, Williams MD, Howlett DC. Pleomorphic adenoma arising from accessory parotid tissue presenting as dysphonia. *J R Army Med Corps* 2008;**154**(1):57–9.
45. Ramachar Sreevathsa M, Huliyappa Harsha A. Accessory parotid gland tumors. *Ann Maxillofac Surg* 2012;**2**(1):90–3. http://dx.doi.org/10.4103/2231-0746.95334.
46. Hamano T, Okami K, Sekine M, Odagiri K, Onuki J, Iida M, Takahashi M. A case of accessory parotid gland tumor. *Tokai J Exp Clin Med* 2004;**29**(3):131–3.
47. Isogai R, Kawada A, Ueno K, Aragane Y, Tezuka T. Myoepithelioma possibly originating from the accessory parotid gland. *Dermatology* 2004;**208**(1):74–8.
48. Tamiolakis D, Thomaidis V, Tsamis I, Jivannakis T, Cheva A, Papadopoulos N. Malignant mucoepidermoid tumor arising in the accessory parotid gland: a case report. *Acta Medica (Hradec Kralove)* 2003;**46**(2):79–83.
49. Kawashima Y, Kobayashi D, Ishikawa N, Kishimoto S. A case of myoepithelioma arising in an accessory parotid gland. *J Laryngol Otol* 2002;**116**(6):474–6.
50. Yoshihara T, Suzuki S, Nagao K. Mucoepidermoid carcinoma arising in the accessory parotid gland. *Int J Pediatr Otorhinolaryngol* 1999;**48**(1):47–52.
51. Quereshy FA, Goldstein JA. Infantile hemangioma of the accessory parotid gland. *J Craniofac Surg* 1998;**9**(5):468–71.
52. Sakurai K, Urade M, Kishimoto H, Takahashi Y, Hozumi S, Yanagisawa T. Primary squamous cell carcinoma of accessory parotid gland duct epithelium: report of a case. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998;**85**(4):447–51.
53. Horii A, Honjo Y, Nose M, Ozaki M, Yoshida J. Accessory parotid gland tumor: a case report. *Auris Nasus Larynx* 1997;**24**(1):105–10.
54. Kakulas EG, Smith AC, Sormann G. Pleomorphic adenoma of the accessory parotid gland: case report. *J Oral Maxillofac Surg* 1994;**52**(8):867–70.
55. Afify SE, Maynard JD. Tumours of the accessory lobe of the parotid gland. *Postgrad Med J* 1992;**68**(800):461–2.
56. Kronenberg J, Horowitz A, Creter D. Pleomorphic adenoma arising in accessory salivary tissue with constriction of Stensen's duct. *J Laryngol Otol* 1988;**102**(4):382–3.
57. Richards AT, Chait LA, Skudowitz RB. Tumours of accessory parotid glands. Case reports. *S Afr Med J* 1984;**65**(24):971–2.
58. Sun S, Wang P, Wang Y, Su W, Wang F, Yang H. Intraductal papilloma arising from the accessory parotid gland: A case report and literature review. *Medicine (Baltimore)* 2018;**97**(20). http://dx.doi.org/10.1097/MD.0000000000010761.
59. Iguchi H, Wada T, Matsushita N, Oishi M, Teranishi Y, Yamane H. Evaluation of usefulness of fine-needle aspiration cytology in the diagnosis of tumours of the accessory parotid gland: a preliminary analysis of a case series in Japan. *Acta Otolaryngol* 2014;**134**(7):768–70. http://dx.doi.org/10.3109/00016489.2014.905704.
60. Liu CC, Jethwa AR, Khariwala SS, Johnson J, Shin JJ. Sensitivity, specificity, and posttest probability of parotid fine-needle aspiration: a systematic review and meta-analysis. *Otolaryngol Head Neck Surg* 2016;**154**(1):9–23. http://dx.doi.org/10.1177/0194599815607841.
61. Mukunyadzi P. Review of fine-needle aspiration cytology of salivary gland neoplasms, with emphasis on differential diagnosis. *Am J Clin Pathol* 2002:S100–S115.
62. Friedman ER, Saindane AM. Pitfalls in the staging of cancer of the major salivary gland neoplasms. *Neuroimaging Clin N Am* 2013;**23**(1):107–22.
63. Hughes JH, Volk EE, Wilbur DC, Cytopathology Resource Committee. College of American Pathologists. Pitfalls in salivary gland fine-needle aspiration cytology: lessons from the College of American Pathologists Interlaboratory Comparison Program in Nongynecologic Cytology. *Arch Pathol Lab Med* 2005;**129**(1):26–31.
64. Atula TS, Varpula MJ, Kurki TJ, Klemi PJ, Grénman R. Assessment of cervical lymph node status in head and neck cancer patients: palpation, computed tomography and low field magnetic resonance imaging compared with ultrasound-guided fine-needle aspiration cytology. *Eur J Radiol* 1997;**25**(2):152–61.
65. Atula TS, Grénman R, Varpula MJ, Kurki TJ, Klemi PJ. Palpation, ultrasound, and ultrasound-guided fine-needle aspiration cytology in the assessment of cervical lymph node status in head and neck cancer patients. *Head Neck* 1996;**18**(6):545–51.
66. Bialek EJ, Jakubowski W, Zajkowski P, Szopinski KT, Osmolski A. US of the major salivary glands: anatomy and spatial relationships, pathologic conditions, and pitfalls. *Radiographics* 2006;**26**(3):745–63.
67. Donovan DT, Conley JJ. Capsular significance in parotid tumor surgery: reality and myths of lateral lobectomy. *Laryngoscope* 1984;**94**(3):324–9.
68. Leverstein H, Tiwari RM, Snow GB, van der Wal JE, van der Waal I. The surgical management of recurrent or residual pleomorphic adenomas of the parotid gland. Analysis and results in 40 patients. *Eur Arch Otorhinolaryngol* 1997;**254**(7):313–7.
69. Witt RL. The significance of the margin in parotid surgery for pleomorphic adenoma. *Laryngoscope* 2002;**112**(12):2141–54.
70. Wittekindt C, Streubel K, Arnold G, Stennert E, Guntinas-Lichius O. Recurrent pleomorphic adenoma of the parotid gland: analysis of 108 consecutive patients. *Head Neck* 2007;**29**(9):822–8.
71. Glas AS, Vermey A, Hollema H, Robinson PH, Roodenburg JL, Nap RE, Plukker JT. Surgical treatment of recurrent pleomorphic adenoma of the parotid gland: a clinical analysis of 52 patients. *Head Neck* 2001;**23**(4):311–6.
72. Phillips PP, Olsen KD. Recurrent pleomorphic adenoma of the parotid gland: report of 126 cases and a review of the literature. *Ann Otol Rhinol Laryngol* 1995;**104**(2):100–4.
73. Zbären P, Tschumi I, Nuyens M, Stauffer E. Recurrent pleomorphic adenoma of the parotid gland. *Am J Surg* 2005;**189**(2):203–7.

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