



Techniques of Endoscope-Assisted Parotidectomy: A Narrative Review

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Abstract

Introduction The modern-day parotidectomy has evolved considerably with the advent of plastic surgery and the introduction of endoscopes in minimally invasive head and neck surgery. The paper reviews various endoscopic-assisted approaches to parotidectomy that have been introduced over time by surgeons with respect to technique and surgical outcomes.

Methods We performed English language searches of Medline/PubMed and Embase databases till August 2022. We used ‘parotidectomy’ and the following text terms—endoscopic, endoscope assisted, and minimally invasive. Reference lists of the selected articles were screened to include relevant studies. The abstract and full text (in some cases) of each identified publication was screened for relevant data on novel approaches to endoscopic parotidectomy. Duplicate studies based on the same patient data sets and studies involving less than ten patients were excluded.

Results and conclusions The paper reviewed the endoscope-assisted preauricular approach, postauricular approach, using two small skin incisions, postauricular approach, retroauricular approach, hairline approach and intraoral approach. Though the studies conducted so far for comparing these techniques with conventional open parotidectomy have been encouraging with respect to cosmetic outcomes and complications, at present, the absence of well-designed prospective observational and interventional studies does not warrant them to be widely employed in clinical practice. This review will guide surgeons in performing

endoscope-assisted parotidectomy incisions in selected patients and provide impetus to further study and improve these techniques. Currently, these should remain limited to the hands of experienced surgeons.

Keywords Parotidectomy · Endoscopic · Minimally invasive · Review

Introduction

The incidence of tumours is highest in the parotid gland among all the salivary glands, and the majority of them are benign [1]. Parotidectomy remains the primary modality of treatment in such cases. Classically, parotidectomy has been carried out using a standard Blair’s incision. However, the fear of long ugly scars made this incision unacceptable to some patients, especially young women. With the advent of reconstructive surgery, and increasing cosmetic concerns of the patients, shorter and more cosmetic open parotidectomy incisions were subsequently introduced [2, 3]. The modern-day parotidectomy has evolved even further with the advent of endoscopes in minimally invasive head and neck surgery. The proposed benefits of endoscope-assisted parotidectomy include shorter incision length and improved visualization and preservation of the neurovascular bundles.

The paper reviews various endoscopic-assisted techniques to parotidectomy that have been introduced over time by surgeons with respect to technique and surgical outcomes in the era of ‘minimally invasive’ surgery. These include the endoscope-assisted periauricular approach, preauricular approach (Fig. 1A), postauricular approach (Fig. 1B), retroauricular approach (Fig. 1C), using 2 small skin incisions (Fig. 1D), hairline approach and intraoral approach (Fig. 1E). The latter part discusses whether these approaches are feasible to

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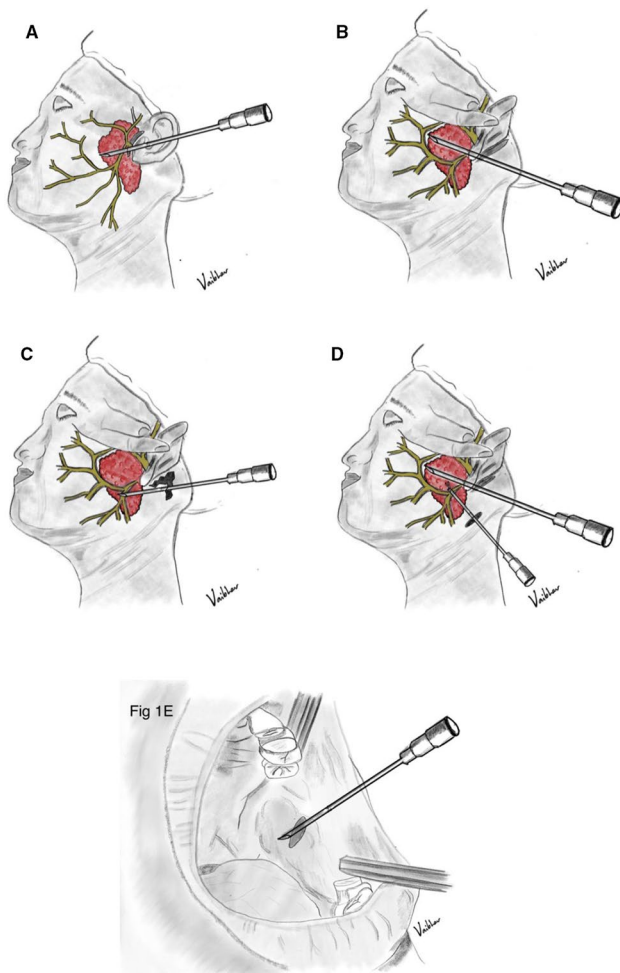


Fig. 1 Various approaches to the endoscope-assisted parotidectomy. **1A** Preauricular approach, **1B** postauricular approach, **1C** retroauricular approach, **1D** using 2 small skin incisions, **1E** intraoral approach

incorporate into the current surgical practice. To the best of our knowledge, no comprehensive narrative review is available on endoscopic-assisted parotidectomy in the literature. This review aims to consolidate and explore the feasibility of endoscopic assisted parotidectomy in the current era. This will guide surgeons in performing endoscope-assisted parotidectomy incisions in select patients and provide impetus to further study and improve these techniques.

Literature Search

We performed English language searches of Medline/PubMed and Embase databases till August 2022. We used ‘parotidectomy’ and the following text terms—endoscopic, endoscope assisted and minimally invasive. Reference lists of the selected articles were screened to include relevant studies. The abstract and full text (in some cases) of each

identified publication was screened for relevant data on novel approaches to endoscopic parotidectomy. Duplicate studies based on same patient data sets were excluded. Only 2 well-conducted randomized controlled trials were available for review. All the other included studies were either observational or case series. Studies involving less than 10 patients were excluded. The included studies are listed in Table 1.

The Endoscope-Assisted Periauricular Approach

Approach This was described by Lin et al. [4]. The patient’s position remains the same as open parotidectomy. The incision extends from the lower border of the zygomatic arch, curves around the earlobe and reaches the retromandibular sulcus posteriorly. Dissection of the peripheral parotid gland is through the use of a 4 mm 30° endoscope through the same incision. The rest of the operation proceeds in a similar fashion as that of conventional parotidectomy.

Indications Lin et al. [4] used this approach to perform subtotal parotidectomy in 16 cases in the age range of 40–75 years with benign parotid tumours with a mean incision length of 6.9 cm (Table 2).

Surgical outcomes Lin et al. [4] report that this approach allowed an enhanced visualisation of facial nerve branches and vessels and there was no incidence of facial nerve palsy in his described series. They operated on 10 cases of pleomorphic adenoma, 4 cases of Warthin’s tumour and 1 case of hemangioma and lipoma each. All patients were discharged on postoperative day (POD) 1 and were reported to be satisfied with the cosmetic result. However, the study did not have a control group (Tables 3 and 4).

The Endoscope-Assisted Postauricular Approach

Approach This approach was described by Chen et al. [5] in 2007. He used an incision length of 2.2–3.5 cm in the postauricular crease and an assistant controlled 4 mm 0° scope and harmonic scalpel for dissection. A nerve stimulator was used to identify and preserve facial nerve branches. Fan et al. [6] used a similar technique using both 0° and 30° scopes and called it the cephalo-auricular approach (Fig. 1B).

Indications Chen et al. [5] used this approach in 14 patients with a variety of inflammatory and benign diseases involving parotid tail with or without parapharyngeal space extension (5 pleomorphic adenomas, 4 Warthin’s tumour, 2 lymph node hyperplasia, 2 sialolithiasis and 1 Castleman’s disease). Later, Fan et al. [6] in 2017 performed an RCT (21 patients in endoscope-assisted group vs. 25 patients in the open parotidectomy group) and included all patients with benign superficial parotid tumours. All patients with malignant swelling, recurrent swelling or ones involving the deep lobe were excluded (Table 2).

Table 1 Studies on various approaches to endoscope-assisted parotidectomy

Studies (year)	Intervention	Surgery	Type of endoscope	Quality of evidence (study design)	No. of patients
Lin et al. [4]	Endoscopic assisted (periauricular)	Subtotal parotidectomy	4 mm, 30°	Case series	16
Chen et al. [5]	Endoscope assisted (post-auricular)		4 mm, 0° and 30°	Case series	14
Sun et al. [7]	Endoscopic assisted (2 small skin incisions)	PSP		Case series	30
Huang et al. [8]	Endoscope assisted (2 small skin incisions) versus conventional open approach	PP	4 mm, 0° and 30°	RCT	18 (endoscopic), 20 (open)
Zhang et al. [9]	Endoscope assisted (preauricular)	APGR	5 mm, 0°	Case series	13
Chen et al. [10]	Endoscope assisted (retroauricular) versus conventional open approach	PSP	4 mm, 0°	Prospective observational	30 (endoscopic), 30 (open)
Yan et al. [13]	Endoscopic (retroauricular) versus conventional open approach		4 mm, 0°	RCT	29 (endoscopic), 29 (open)
Woo et al. [15]	Endoscope assisted (hairline)	ECD	10 mm, 0°	Case series	18
Fan et al. [6]	Endoscope assisted (post-auricular)	ECD	4 mm, 0° and 30°	RCT	21 (endoscopic), 25 (open)
Li et al. [14]	Endoscope assisted (retroauricular)	51 (PSP), 15 (SP), 5 (TP), 1 (deep lobe resection)	4 mm, 0° and 45°	Observational	15 (endoscopic), 57 (open)
Gao et al. [14]	Endoscope assisted (temporal, retroauricular hairline, retromandibular)	NR	4 mm, 0°	Retrospective observational	37 (endoscopic), 87 (open)
Kim et al. [17]	Endoscopic (transoral) versus conventional open approach	APGR	10 mm, 0°	Multicentre prospective observational	20 (endoscopic), 22 (open)

ECD extracapsular dissection, P(S)P partial (superficial) parotidectomy, TP total parotidectomy, APGR accessory parotid gland resection, NR not reported

Table 2 Intraoperative characteristics in various approaches to endoscopic parotidectomy

Studies (year)	Incision length (cm)		Operative time (min)		Tumour diameter (cm)		Bleeding volume (ml)	
	Open	Endoscopic	Open	Endoscopic	Open	Endoscopic	Open	Endoscopic
Lin et al. [4]	–	6.9	–	NR	–	NR	–	NR
Chen et al. [5]	–	3.1	–	114	–	3.9 cm	–	Minimal
Sun et al. [7]	–	2–2.5 cm each (2 incisions)	–	106.48	–	<3 cm	–	14.68
Huang et al. [8]	NR	2–2.5 cm each (2 incisions)	105.25	108.61	2.43	2.36	30.25 ^a	13.89 ^a
Zhang et al. [9]	–	1.5–2.5	–	54	–	2.2–3.2	–	4–15
Chen et al. [10]	12.2 ^a	4.8 ^a	103.2 ^a	74.8 ^a	2.5	2.4	31 ^a	12.7 ^a
Yan et al. [13]	9.3 ^a	4.3 ^a	138.1	141.7	2.9	2.8	108.6 ^a	26.6 ^a
Woo et al. [15]	–	5.5	–	82.5	–	2	–	Minimal
Fan et al. [6]	9.1 ^a	3.6 ^a	79.4	83.1	2.8	2.7	90.7 ^a	23.6 ^a
Li et al. [14]	NR	NR	115	98	3	2.3	50 ^a	30 ^a
Gao et al. [14]	12.98 [*]	4.66 ^a	120.34 [*]	97.84 ^a	2.38	2.35	65.29 ^a	26.76 ^a
Kim et al. [17]	6.4 ^a	3.55 ^a	82.72 ^a	47.5 ^a	2.59	2.8	Minimal	Minimal

NR not reported. ^aThe results were statistically significant

Table 3 Postoperative complications in studies on endoscopic parotidectomy

Studies (year)	Frey's syndrome		Facial nerve palsy/paresis ^b		Others		Tumour recurrence (follow-up time)
	Open	Endoscopic	Open	Endoscopic	Open	Endoscopic	
Lin et al. [4]	–	NR	–	Nil	–	NR	NR
Chen et al. [5]	–	Nil	–	2	–	Nil	1 (in deep lobe) (26 months)
Sun et al. [7]	–	Nil	–	3	–	1 (salivary fistula)	Nil (39 months)
Huang et al. [8]	Nil	Nil	2	1	1 (salivary fistula)	1 (salivary fistula)	Nil (26–40 months)
Zhang et al. [9]	–	Nil	–	Nil	–	nil	Nil (3–14 months)
Chen et al. [10]	nil	Nil	Nil	1	nil	nil	Nil (23 months)
Yan et al. [13]	5	1	8 ^a	2 ^a	4 (salivary fistula)	1 (salivary fistula)	Nil (3–72 months)
Woo et al. [15]	–	Nil	–	1	–	nil	Nil (17 months)
Fan et al. [6]	1	0	6	2	7 (earlobe numbness) 2 (salivary fistula) 0 (seroma)	2 (earlobe numbness) 1 (salivary fistula) 1 (seroma)	Nil (median 25-months endoscopic group, 27-months open group)
Li et al. [14]	2	0	8	3	20 (earlobe numbness)	1 (earlobe numbness)	Nil (33 months)
Gao et al. [14]	5	2	18	8	19 (earlobe numbness) 10 (salivary fistula) 15 (salivary secretion)	7 (earlobe numbness) 4 (salivary fistula) 26 (salivary secretion)	0 (endoscopic group, 12 months), 1 (open group, 14 months)
Kim et al. [17]	5	0	3	1	1 (flap necrosis)	nil	Nil (13.4 months endoscopic, 14.45 months open)

^aThe results were statistically significant. ^bFacial nerve paralysis/paresis was transient in all studies. No case of permanent facial nerve injury was documented in any study

Table 4 Cosmetic outcomes in studies on endoscopic parotidectomy

Studies (year)	Method of evaluation	Endoscopic parotidectomy	Open parotidectomy
Lin et al. [4]	Subjective	All satisfied	–
Chen et al. [5]	Subjective	Invisible scars	–
Sun et al. [7]	Subjective	All satisfied	–
Huang et al. [8]	Subjective	All satisfied	NR
Zhang et al. [9]	Subjective	Invisible scars, satisfied	–
Chen et al. [10]	Subjective (VAS score)	8.6 ^a	5.4 ^a
Yan et al. [13]	Subjective (VAS score)	8.9 ^a	6.7 ^a
Woo et al. [15]	Subjective (VAS score)	9.77	–
Fan et al. [6]	Subjective (VAS score)	9.1 ^a	6.3 ^a
Li et al. [14]	Subjective (VAS score) ^b	0 ^a	3 ^a
Gao et al. [14]	Subjective	All satisfied	NR
Kim et al. [17]	Objective (10-point numerical score)	9.71 ^a	7.09 ^a

^aThe results were statistically significant. ^bReverse VAS scale score was used in this study where a lower score meant esthetically better scars

Surgical outcomes In a case series of 14 patients by Chen et al. [5], the operating time varied from 60 to 160 min (mean 114 min) which is higher than that of conventional parotidectomy. Two patients had transient facial nerve paresis. All patients were satisfied with the cosmesis as the scar diminished under the postauricular crease. There was one reported case of recurrence in the deep lobe of the parotid

in this series. Fan and colleagues [6] compared the surgical outcomes of 21 patients in endoscope-assisted group versus 25 patients in the open parotidectomy group in an RCT and found that intraoperative blood loss (24 ml vs. 90 ml), drain output (31 ml vs. 55 ml) and complications (numbness, facial paresis, Frey's syndrome) were statistically significantly lower in endoscope-assisted group. In addition,

the patient satisfaction score as measured by the visual analogue scale was also statistically significantly higher in the endoscope-assisted group. There was no recurrence in either group (Tables 3 and 4).

The Endoscope-Assisted Approach Using 2 Small Skin Incisions

Approach Sun et al. [7] first described this approach in 2009 in a case series of 30 patients under both general anaesthesia (21 patients) and sedation with local anaesthesia (9 patients). One incision of 2–2.5 cm was made in the ipsilateral neck one fingerbreadth below the angle of the mandible. Another skin incision of similar length was made in the perilobular region parallel to the first incision. The incisions were used for a 4 mm 0° scope which provided enhanced visualisation of the greater auricular nerve and marginal mandibular nerve. Harmonic scalpel was used for dissection. The working space was created using angled retractors, and retrograde facial nerve dissection was performed (Fig. 1D).

Indications Sun et al. [7] used this approach in 30 patients (22 males and 8 females) with benign superficial parotid tumours anterior or inferior to the ear lobule with sizes up to 3 cm who underwent partial superficial parotidectomy. All inflammatory and malignant swellings were excluded. Later, Huang et al. [8] also reported using this technique in 18 cases of benign superficial parotid tumours < 3 cm in a randomised controlled trial (RCT) (Table 2).

Surgical outcomes in the case series were described by Sun et al. The mean operating time was 106 min and the mean bleeding volume of 14.6 ml with all patients being discharged on POD 1. There was no conversion. However, in very selective cases this approach was used. Three patients developed transient facial nerve palsy, and 1 developed salivary gland fistula with no reported recurrence in a follow-up at 39 months. All patients were subjectively satisfied with cosmetic results. The incision length was shorter than the periauricular and postauricular approach described by Lin et al. [4] and Chen et al. [5], respectively. In addition, this retrograde approach minimized great auricular nerve injury in 80% of patients which preserved sensation in the ear lobule.

Huang et al. [8] reported their findings of RCT (18 patients in the endoscope-assisted group and 20 in the conventional open parotidectomy group). There was no conversion. The intraoperative bleeding was significantly lower in the endoscopically assisted group compared to open parotidectomy (13.9 ml vs. 30.3 ml, $p < 0.001$). The rest of the parameters including operative time were not significantly different. One patient in the endoscope-assisted group and 2 patients in the open parotidectomy group developed transient facial nerve palsy (Tables 3 and 4).

The Endoscope-Assisted Preauricular Approach

Approach Zhang et al. [9] used a 1.5–2.5 cm tragal incision with a 5 mm 0° scope for this technique, and electrotome was used for tissue dissection. The rest of the operative steps were similar to that described for the postauricular approach (Fig. 1A).

Indications 13 patients with benign tumours of the accessory parotid gland (lipomas, fibromas and hemangiomas) were operated on using this technique with tumour dimensions ranging from 2.2 to 3.2 cm (Table 2).

Surgical outcomes the mean operating time as described by Zhang et al. [9] was 54 min with a total blood loss of 4–15 ml. There was no conversion to open. There was no incidence of facial nerve palsy, Frey's syndrome or tumour recurrence in a follow-up of 14 months (Tables 3 and 4).

The Endoscope-Assisted Retroauricular Approach

Approach this technique is the most well studied among all the endoscope-assisted approaches and was described by Chen et al. [10] in 2014. Here a skin incision of 4–5.5 cm was made starting from the ear lobe ditching up along the postauricular crease and then curving towards the mastoid. This incision was initially described for the removal of upper neck masses and has also been used for open parotidectomy [11, 12]. Working space is created using retractors, and dissection is done using an electrotome or harmonic scalpel using a 4 mm 0° scope. The rest of the operative steps remain the same as the postauricular approach. Yan et al. [13] slightly modified this approach by using a balloon of the Foley's catheter (water sac) to raise the skin flaps (Fig. 1C).

Indications in a prospective observational study by Chen et al. [10], 30 patients with benign tumours anterior and inferior to the ear lobule underwent parotidectomy using this technique. All tumours were in the superficial lobe with a maximum dimension of 3 cm. Later, Li et al. [14] also used this approach for low-grade T1 and T2 tumours of < 4 cm without lymph node metastasis (Table 2).

Surgical outcomes Surgical outcomes of the endoscope-assisted retroauricular approach reported by various authors are summarized in Tables 2, 3 and 4. Chen and colleagues [10] used this technique in 30 patients and compared it with 30 patients of open parotidectomy prospectively. None of the patients had a conversion to open. One patient in the endoscopic group had transient facial nerve palsy. There was no incidence of Frey's syndrome and tumour recurrence during a mean follow-up of 23 months. Yan and colleagues [13] reported their experience with this technique in an RCT (29 patients in the endoscope-assisted group versus 29 patients in the open parotidectomy group). Incision length (4.3 cm vs. 9.3 cm), intraoperative bleeding (26.6 ml vs. 108.6 ml) and incidence of facial nerve paresis (6.9% vs. 27.6%) were

significantly lower in the endoscope-assisted group. Moreover, the subjective satisfaction with the scar on a 3-point scale was also lower in the endoscope-assisted group.

In an observational study, Li et al. [14] found that in the endoscope-assisted group (15 patients), the incidence of auricular skin numbness and intraoperative blood loss was significantly lower than in the open parotidectomy group (57 patients). Both groups were similar in other preoperative and intraoperative characteristics. One case of deep lobe resection was also performed through the endoscope assistance. In addition, the cosmetic satisfaction measured through 10-point VAS scores 3 months post surgery was significantly higher in the endoscope-assisted groups (Tables 3 and 4).

The Endoscope-Assisted Hairline Approach

Approach this technique is similar to the retroauricular and postauricular approach except for the skin incision which is made 5–7 cm long along the posterior hairline which is longer than the previously described endoscope-assisted approaches. Woo et al. [15] used a 10 mm 0° scope with this technique for dissection.

Indications Woo et al. [15] described their experience in 18 patients with this technique with benign parotid tumours (Warthin's tumour and pleomorphic adenoma) in the age group of 19–42 years.

Surgical outcomes in the case series of 18 patients by Woo et al., there was no conversion to open with a mean operative time of 82.5 min and minimal blood loss. One patient developed transient facial nerve palsy. There was no incidence of tumour recurrence in 17 months' of follow-up (Table 2).

Gao et al. [16] used 3 different skin incisions for endoscope-assisted parotidectomy on 37 patients based on the location of the tumour (the posterior hairline incision for middle or inferior lobe tumours, temporal hairline incision for superior lobe tumours and retromandibular incision for deep lobe tumours) and compared it with 87 patients of open parotidectomy in a prospective observational study. Tumours of size > 6 cm or malignancies were excluded. The length of incision (4.7 cm vs. 13 cm), intraoperative blood loss (26.8 ml vs. 65.3 ml) and operative time were significantly lower in the endoscope-assisted group. However, there were no significant differences in postoperative complications (Tables 3 and 4).

The Endoscope-Assisted Intraoral Approach

Approach This technique was described by Kim et al. [17] for accessory parotid gland tumours. Here, after intraoral marking of the accessory duct tumour and the parotid duct, mucosal flaps are raised after an incision is made over the tumour parallel to the duct. Dissection is done using a

10 mm 0° scope. Nerve stimulation is used to identify the facial nerve branches (Fig. 1E).

Indications This technique was applied to patients with the diagnosis of benign accessory parotid gland tumours over a 6-year period. Malignant and inflammatory swellings were excluded.

Surgical outcomes In a multicentric prospective observational study, Kim et al. [17] compared 20 patients with endoscope-assisted intraoral parotidectomy with 22 patients with conventional open parotidectomy. The incision length (3.5 cm vs. 6.4 cm) and operative time (47.5 min vs. 82.7 min) were found to be significantly lower in the intraoral group. The cosmetic scores on a 10-point scale were also higher in the intraoral group. Only 1 patient in the intraoral group developed transient facial nerve palsy. However, no between-group differences were seen in the development of recurrence, facial paralysis, Frey syndrome or salivary fistula (Tables 2, 3 and 4).

Discussion

Various new techniques of endoscopic-assisted parotidectomy have been introduced in the last decade. The impetus for such a change was due to the introduction of endoscopes in head and neck surgery and a concurrent increasing awareness about facial and neck scars on part of both surgeons and patients. These techniques are new and the expertise available is limited. Currently, these techniques are applied to carry out superficial or partial parotidectomy for small benign tumours (usually < 5 cm in size) in the parotid or accessory parotid glands [9, 17, 18]. Some authors have used them for inflammatory swellings also [5]. Common contraindications include malignant, recurrent or deep lobe tumours or patients with a prior history of neck surgery or irradiation. This is due to the risk of incomplete resection, failure to achieve negative margins, difficult dissection, inability to carry out lymph node dissection if needed and conversion to open parotidectomy.

The current evidence indicates that endoscopically assisted parotidectomy significantly decreases the length of the incision. A systematic review by Chen et al. [18] showed that endoscopic parotidectomy was associated with significantly shorter incision length (– 5 cm, $p < 0.01$), lower intraoperative bleeding (– 42.8 ml, $p < 0.01$) and higher cosmetic satisfaction (1.9, $p < 0.01$). The average length of incision in the endoscopic parotidectomy and open parotidectomy group was found to be < 5 and > 5 cm, respectively, in this study. Studies comparing the length of hospital stay between endoscopic and conventional parotidectomy are a few. In the study by Gao et al. [16], the average length of hospital stay in the endoscopic parotidectomy group was 9.1 days versus 11.3 days in the

conventional open parotidectomy group. In the study by Li et al. [14], the hospital stay duration was 5 days in the endoscopic parotidectomy group versus 6 days in the open parotidectomy group. Pooled estimates indicate that the endoscopic parotidectomy is significantly associated with shorter hospital stay by 2.3 days compared to open parotidectomy group [18].

No significant differences were found in the operating time between the two groups in a study by Moori et al. [19]. However, these conclusions are primarily based on observational studies or case series involving small patient sets. Operative and postoperative complications of these approaches are similar to the conventional open parotidectomy with Blair's incision. However, multiple authors have experienced an improved visualization of the facial nerve trunk and its branches and greater auricular nerve through the endoscope [4, 16]. This may theoretically decrease the risk of the development of transient and permanent facial nerve palsy and ear lobe numbness. The current evidence in this regard has been favourable but not statistically significant based on current literature [18]. This is analogous to improved visualization of recurrent laryngeal nerve in endoscopic thyroidectomy [20]. Moreover, an endoscope may allow for more meticulous dissection and improved visualisation of the vessels, decreasing the risk of Frey's syndrome, intraoperative bleeding and postoperative drain output. However, the evidence for these statements is not robust.

Endoscopic parotidectomy comes with a unique set of challenges and demerits which may have led to a lower acceptance of these techniques among head and neck surgeons. First, these techniques have a significant learning curve and have very limited expertise. Thus, they better be left to the hands of experienced surgeons in high-volume centres. More importantly, the amount of dissection required to carry out surgery may be similar to the conventional open parotidectomy. Thus, these techniques may not be 'minimally invasive' as is claimed. Similar concerns have been raised for endoscopic thyroidectomy as well [21]. However, in an interesting study by Zhao et al., endoscope-assisted parotidectomy was associated with lower surgical stress response compared to open parotidectomy [22]. This may allow for faster recovery.

In addition, creating a working space is difficult. Authors have used angled retractors for creating space. There is limited space for the introduction and manipulation of endoscopes which limits their applicability to easily accessible small superficial tumours. A variety of endoscopes including 4 mm, 5 mm or 10 mm scopes with 0° or 30° have been used for this purpose depending upon the surgeon's preference and the technique used. Some surgeons argue to use loupes over endoscopes as they are able to provide similar magnification. However, since the incision is small, loupes are

not usually able to solve the purpose while dissecting facial nerve under the flap or raising the flap.

The current studies have compared endoscope-assisted parotidectomy with the conventional open parotidectomy using Blair's incision. However, modified open parotidectomy incisions such as facelift incision have been shown to be cosmetically superior when compared to Blair's incision [2]. Thus, additional studies are needed which compare the outcomes between parotidectomy using facelift incision and endoscopic parotidectomy. Lastly, the use of endoscopes and other laparoscopic instruments along with limited expertise may increase the cost of treatment. However, this has not been studied in the current literature.

Conclusion

At present, there is limited literature in support of these new endoscopic-assisted techniques for parotidectomy. However, this provides impetus to experiment with new techniques and see whether they can decrease morbidity and improve the quality of life in these patients. Further studies are required in the form of randomized trials and prospective observational studies to assess whether it benefits patient outcomes. Till then, these techniques remain limited to the select patients with benign diseases in the hands of experienced surgeons.

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Declarations

Conflict of interest The author has not disclosed any competing interests.

Ethical Approval
Not applicable.

Consent for Publication Not applicable.

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