BMC Oral Health

RESEARCH

Open Access

Local anaesthesia with conscious sedation in parotid gland tumour resection: a retrospective review

Shiyuan Liu[1], Heli Shen[2], Futian Yang[1], Pengzhan Dai[1], Zhiquan Huang[3*], Wei Li[1*] and Xianjun Zhang[1*]

Abstract

Objectives This study explored the suitability of local anaesthesia with conscious sedation for parotid gland tumour surgery.

Methods Three hundred sixty-four medical records were reviewed to gather data on several key aspects for retrospective analysis. These included age, incision length, operation time, tumour size, NNIS score, ASA score, and pathology. Additionally, we documented postoperative complications.

Results A total of 111 patients underwent surgery under local anaesthesia with conscious sedation, while 253 patients underwent surgery under general anaesthesia. We found significant differences in surgical time, incision length, tumour location and tumour size between the two groups. There was no difference in postoperative complications or age.

Conclusions Performing parotid gland tumour resection under local anaesthesia with conscious sedation is feasible. Compared with general anaesthesia, this approach does not increase the risk of complications or surgical trauma and can reduce the risk of anaesthesia-related complications. This is beneficial for expanding surgical treatment indications, allowing some patients who cannot tolerate general anaesthesia to also receive treatment.

Keywords Parotid gland tumour, Local anaesthesia, Extracapsular resection

Introduction

Parotid gland tumours constitute approximately 80% of all salivary gland tumours. Once they undergo malignant transformation, they are potentially life-threatening [1]. Surgical resection is the most frequently employed therapeutic approach. With the advancement of surgical techniques, extracapsular resection is gradually replacing traditional superficial lobe removal of the parotid gland [2]. Both the trauma associated with surgery and the scope of the procedures are decreasing.

Owing to the high degree of trauma and long duration of traditional surgical procedures, parotid gland tumour resection surgery is generally performed under general anaesthesia (GA) [3]. Although surgery under general

*Correspondence:
Zhiquan Huang
hzhquan@mail.sysu.edu.cn
Wei Li
honghai_lw@163.com
Xianjun Zhang
xcszxyykqk@126.com
[1]Department of Oral and Maxillofacial Surgery, Xuchang Central Hospital, Henan, China
[2]Publicity Department, Xuchang University, Henan, China
[3]Department of Oral and Maxillofacial Surgery, Sun Yat-sen Memorial Hospital, Guangzhou, China

anaesthesia can provide good outcomes, it has disadvantages such as high cost and numerous complications [4]. Even some patients are unable to undergo surgery because of the high risk of anaesthesia-related complications. Owing to its association with less surgical trauma, local anaesthesia (LA) began to be proposed for the resection of parotid gland tumours. Scholars such as Siu and Michael Chang evaluated the potential clinical applications of local anaesthesia and confirmed the possibility of performing parotid gland tumour resection under local anaesthesia [5, 6].

There is little research on local anaesthesia techniques, especially in parotid gland tumour surgery to date. We aimed to evaluate the differences in incision length, operation time, tumour size, tumour location and incidence of complications between local anaesthesia with conscious sedation and general anaesthesia retrospectively and assessed the potential advantages and disadvantages of local anaesthesia with conscious sedation to promote its use in clinical work.

Materials and methods

Patients included and date collection

From January 2019 to January 2024, we retrospectively reviewed the medical records of 364 patients admitted to the Department of Oral and Maxillofacial Surgery for the management of parotid gland tumours. The inclusion criteria for this study were as follows: pathological diagnosis of a parotid gland tumour and surgical treatment. The exclusion criterion for this study was missing clinical data. We mainly select the anaesthesia method on the basis of the patient's preferences and wishes, provided that the surgery can be successfully completed. Prior to this, we thoroughly informed the patient of different anaesthesia methods and their differences, including costs, potential complications, and pain levels. The patient then decided on the final anaesthesia method. However, for patients who present with significant postoperative defects and require concurrent repair with vascularized free skin flap transplantation, we recommended general anaesthesia. Moreover, for patients with malignant tumours, we emphasized the potential risks of pain and other complications associated with local anaesthesia and advised that general anaesthesia may be a more favourable option. The following data were extracted from medical records: age, incision length, operation time, tumour size, tumour location, National Nosocomial Infections Surveillance Risk Index (NNIS) score, American Society of Anaesthesiologists Physical Status Classification (ASA score), and pathology. Additionally, we documented any postoperative complications, such as transient facial nerve injury, greater auricular nerve injury, glandular fistula, haematoma, and Frey's syndrome. Patients were followed up for 6 to 8 weeks.

Anaesthetic technique

The patient should be placed in a supine posture. The head was tilted to the left or right on the basis of tumour location. Local anaesthesia was induced via local infiltration with lidocaine combined with the inhalation of nitrous oxide (commonly known as laughing gas). Oxygen was mixed with a 65% concentration of laughing gas and administered at a flow rate of 3 L/min through an oxygen mask for sedation. A mixture of 1% lidocaine and a 1:100,000 adrenaline hydrochloride solution was used for local infiltration anaesthesia. Anaesthesia was induced at the superficial location of the expected surgical range. For anaesthesia of deep tissues, deep infiltration anaesthesia should be induced after the surface incision. After the skin was incised, the concentration of laughing gas was adjusted to 30% to maintain sedation and analgesia. General anaesthesia is administered by an anaesthesiologist. Following the intravenous injection of sedatives, analgesics, and muscle relaxants such as propofol, fentanyl, and rocuronium bromide, anaesthesia was successfully induced by inhaling sevoflurane through an oxygen mask. Once tracheal intubation was completed, propofol was administered intravenously via an electronic infusion pump to maintain general anaesthesia.

Surgical technique

The surgical plan was determined on the basis of whether the tumour is benign or malignant. Benign tumours are treated with extracapsular resection, whereas malignant tumours necessitate total parotidectomy. The position and length of the surgical incision were determined on the basis of the size and location of the tumour. In early cases, the decision was made on the basis of the surgeon's experience. In more recent cases, we used digital partitioning methods for selection [7]. We dissected from the deep surface of the superficial musculo-aponeurotic system (SMAS) fascia and fully exposed the superficial tissues of the parotid gland before performing deep tissue resection. The great auricular nerve was always preserved. We used the retrograde facial nerve dissection method without actively dissecting the main trunk of the facial nerve. We enlarged the margin of the tumour by 1 cm for tumour and glandular resection. In most cases, the main trunk of the facial nerve was not exposed. During the surgical process, energy devices such as electric and ultrasonic knives were not used. Haemostasis of wounds was achieved via local compression and suturing. Although this approach compromised clarity and dryness of surgical field of view, it effectively reduced stimulation of the facial nerve as well as patients' fear and discomfort.

The decision as to whether to perform parotid gland resection and partial lymph node dissection or not, was determined on the basis of the results of an intraoperative frozen section. After surgery, we placed a negative

pressure drainage pot in the surgical area. The wound was sutured in layers and aligned. Simultaneously, we used craniofacial bandages for local compression and fixation. Patients were taken directly to the ward and began chewing and eating 2–4 h poster surgery. The drainage tube was removed when the 24-hour drainage fluid volume was less than 15 ml.

Statistical analyses

Statistical analyses were conducted using SPSS V.22 (IBM) and GraphPad Prism V.8.0. Continuous variables (age, incision length, operation time, and tumour size) are reported as means and standard deviations. Categorical variables (tumour location, NNIS, ASA score, pathology, transient facial nerve injury, greater auricular nerve injury, glandular fistula, haematoma, and Frey's syndrome) are reported as percentages and frequencies. For continuous variables, an unpaired t test or Welch's t test was used, whereas Fisher's exact test was applied for categorical variables. We used Cohen's d to evaluate the effect size of the t test in our analysis. It calculates the effect size by dividing the difference between two means by the pooled standard deviation. A value of 0.2 represents a small effect size, 0.5 represents a medium effect size, and 0.8 represents a large effect size. Fisher's exact test does not provide effect values. We used chi square test-related effect values and Cramer's V and Phi coefficients to determine the degree of correlation. Cramer's V values between 0 and 0.1 indicate a weak correlation, values between 0.1 and 0.3 indicate a moderate correlation, and values above 0.3 indicate a strong correlation. When the Phi coefficient is less than 0.3, the correlation is considered weak; when the Phi coefficient is greater than 0.6, it indicates a strong correlation. A p value less than 0.05 indicated statistical significance.

Results

From January 2019 to January 2024, a total of 111 patients underwent surgery under local anaesthesia, while 253 patients underwent surgery under general anaesthesia. The patients' basic information and surgery-related data are summarized in Table 1.

The average age of patients who underwent surgery under LA was 52.55 years. The average surgical time under LA was 88.96 min. The average tumour size of patients who underwent surgery under LA was 18.63 mm^3. The average incision length of patients who underwent surgery under LA was 5.5 centimetres. On the basis of the NNIS, 99 patients scored 0, 11 patients scored 1, and 1 patient scored 2. In terms of the ASA score, 43 patients were classified as P1, 67 patients as P2, and 1 patient as P3. Most diagnoses were benign tumours, including pleomorphic adenoma, Warthin's tumour, basal cell adenoma, and eosinophilic adenoma. Forty-eight tumours were located in the deep lobe and 63 were located in the superficial lobe. There were 7 malignant tumours, mainly mucoepidermoid carcinoma and adenoid cystic carcinoma.

The average age of patients who underwent surgery under GA was 55.4 years. The average surgical time under GA was 108.2 min. The average tumour size of patients who underwent surgery under GA was 33.49 mm^3. The

Table 1 Patient's basic information and surgical related data

		GA ($n=253$)	LA ($n=111$)	*P* Value	Effect size
NNIS				0.1270	0.1054
	0	205(81.03%)	99(89.19%)		
	1	40(15.81%)	11(9.91%)		
	2	8(3.16%)	1(0.90%)		
ASA score				0.4368	0.8800
	P1	105(41.50%)	43(38.74%)		
	P2	141(55.73%)	67(60.36%)		
	P3	7(2.77%)	1(0.90%)		
Pathology				0.5625	0.3600
	Pleomorphic adenoma	89(35.18%)	40(36.03%)		
	Warthin's tumor	85(33.60%)	32(28.83%)		
	Other benign tumors	58(22.92%)	32(28.83%)		
	malignant tumor	21(8.30%)	7(6.31%)		
Tumor location				0.0122*	0.4000
	Deep lobe	146(57.71%)	48(43.24%)		
	Superficial lobe	107(42.29%)	63(56.67%)		
Age(years)		55.40 ± 0.96	52.55 ± 1.34	0.0966	0.0870
Operation time(minutes)		108.20 ± 4.42	88.96 ± 3.77	0.0010**	0.3930
Size of tumor(cubic millimeter)		33.49 ± 3.82	18.63 ± 1.79	0.0005**	0.2210
Incision length(cm)		6.40 ± 0.12	5.50 ± 0.15	< 0.0001***	0.2160

Table 2 Complications occurrence

	GA ($n=253$)	LA ($n=111$)	*P* Value	Effect size
Transient facial nerve injury	36(14.23%)	9(8.11%)	0.1204	0.3300
Greater auricular nerve injury	16(6.32%)	4(3.60%)	0.4534	0.4300
Glandular fistula	1(0.40%)	1(0.90%)	0.5175	0.3900
Hematoma	17(6.72%)	3(2.70%)	0.1407	0.4400
Frey's syndrome	6(2.37%)	2(1.80%)	>0.9999	0.4300

average incision length of patients who underwent surgery under GA was 6.4 cm. On the basis of the NNIS, 205 patients scored 0, 40 patients scored 1, and 8 patients scored 2. According to the ASA, 105 patients were classified as P1, 141 patients were classified as P2, and 7 patients were classified as P3. There were 146 tumours located in the deep lobe and 107 located in the superficial lobe. There were 21 malignant tumours, including mucoepidermoid carcinoma, adenoid cystic carcinoma, and squamous cell carcinoma. We found significant differences between the two groups in terms of surgical time, incision length, tumour location and tumour size.

The related complications are shown in Table 2. The most common complication is transient facial nerve injury. The incidence of complications associated with general anaesthesia is higher than that associated with local anaesthesia, but this difference is not statistically significant.

Discussion

General anaesthesia is a widely used technique in clinical practice. This technique is indispensable for surgical procedures and has played an important role in the development of surgical techniques. General anaesthesia is advantageous in that patients do not experience pain, thus reducing their psychological burden. It thoroughly relaxes muscles to facilitate surgical operations. Moreover, it plays an irreplaceable role in high-end and complex surgeries. However, in previous research, scholars discovered some shortcomings of general anaesthesia [8]. First, it interferes with the patient's physiological status, possibly leading to various complications, such as nausea, vomiting, and delirium [9]. Second, general anaesthetics have a certain impact on liver and kidney functions of the human body [10]. Finally, general anaesthesia is associated with a high risk of cardiovascular and cerebrovascular accidents [11], which can lead to life-threatening complications. In contrast, local anaesthesia can overcome the potential problems and risks associated with general anaesthesia. Additionally, it is fast-acting and more cost-effective. In our study, there was no significant difference in the NNIS or ASA score between the two anaesthesia methods. We believe that the risk of anaesthesia-related complications is not the key factor in choosing between local anaesthesia and general anaesthesia.

Maren C. Locke concluded through a systematic analysis of multiple studies that local anaesthesia is less expensive and has fewer complications when it can be utilized [12]. Research by Douglas Campbell indicated that general anaesthesia is associated with a better prognosis when endovascular thrombectomy is performed for large vessel occlusion-induced ischaemic stroke [13]. Research by Thomas Galetin demonstrated that local anaesthesia has the potential to serve as an equivalent alternative to general anaesthesia [14]. On the basis of the research of the scholars mentioned above, we believe that in clinical practice, anaesthesia methods should be selected reasonably according to the type of surgery, the patient's specific condition, and the anaesthesiologist's experience. For complex and prolonged major surgeries, general anaesthesia remains the first choice. For simple and quick surgeries, local anaesthesia is safer.

Traditional parotid gland resection surgery involves the removal of either the superficial part or the entire parotid gland, prolonging the procedure and causing significant surgical trauma. General anaesthesia is often considered the best choice for such procedures. However, with advancements in research, extracapsular resection of parotid gland tumours is being increasingly accepted among scholars. Multiple clinical studies have confirmed the effectiveness and safety of this approach [2, 15]. The use of this technique significantly reduces the risk of trauma associated with parotid gland tumour resection surgery and substantially shortens the surgical time. Consequently, local anaesthesia has emerged as a viable option for parotid gland extracapsular resection. Our surgical plan involves extracapsular resection. Parotidectomy is only performed when frozen pathological examination suggests malignant tumours.

MAS Tesseroli successfully performed partial parotid gland resection under local block anaesthesia and suggested that, with careful patient selection, local anaesthesia can be effectively applied in parotid gland tumour surgery [3]. The study by Siu and Michael Chang further confirmed the suitability of local anaesthesia for parotid gland tumour surgery [5, 6], and our research confirmed this finding as well. Furthermore, by comparing surgeries performed under general anaesthesia, we determined that local anaesthesia may be a superior choice in terms of surgical time, incision length, and other factors.

Patients under local anaesthesia had shorter surgical times and surgical incisions. This information is encouraging and preliminarily demonstrates the feasibility and potential advantages of local anaesthesia in parotid gland tumour surgery. However, when we compared tumour size, we found that patients under local anaesthesia had smaller tumours. This is a source of concern that cannot be ignored. Smaller tumours indicate faster surgery and smaller incisions. We divided the parotid gland into deep and superficial lobes using the facial nerve as the boundary and evaluated the respective proportions under different anaesthesia methods. Approximately 43% of local anaesthesia patients have deep lobe tumours, which confirms that the application scope of local anaesthesia can be extended to the entire parotid gland region. However, in patients who underwent surgery under local anaesthesia, the proportion of superficial lobe tumours was greater than that in patients who underwent surgery under general anaesthesia. This is also an important confounding factor. Further research may be needed to explain the possible differences between local anaesthesia and general anaesthesia, especially in terms of tumour size and location. Unlike tumours in other oral regions, glandular-derived tumours are not suitable for biopsy due to the risk of implant metastasis. Fine needle aspiration has been proposed and is widely used for the preoperative diagnosis of parotid gland tumours [16]. Dr. WHM de Sousa Lacerda discovered through retrospective research that the accuracy of fine needle aspiration biopsy in identifying malignancy is approximately 68% [17]. However, this level of diagnostic accuracy is not ideal. Intraoperative frozen sections have been proposed to compensate for the lack of accuracy. Research by RG Pastorello demonstrated that the use of intraoperative frozen sections is a more reliable diagnostic method [18]. Varazzani further demonstrated the importance of intraoperative frozen sections in a 10-year study [19]. Therefore, our treatment process involves intraoperative frozen section examination rather than preoperative fine needle aspiration examination. The results are satisfactory. The routine pathological results after surgery did not overturn the rapid frozen pathological examination, which may be related to our small number of cases. However, these findings further demonstrate the high accuracy of frozen pathology. We believe that in most cases, fine needle aspiration biopsy is not necessary.

There were two cases of parotid squamous cell carcinoma in our study. The patient's tumour progressed rapidly and had already affected the skin when they sought medical attention. Moreover, imaging and tumour marker examination suggested a high possibility of malignant tumours. We performed a preoperative biopsy. This is because the patient's skin had already been affected, and regardless of the outcome, the adhesive part of the skin was removed during the surgical process. The positive rate of biopsy is significantly higher than that of fine needle aspiration. The final inspection results also support our preliminary considerations. The treatment plan for squamous cell carcinoma of the parotid gland is different from that for glandular-derived tumours. Therefore, for patients highly suspected of having malignant tumours with possible skin involvement, biopsy can also be considered a method.

Neuroblock anaesthesia is the most common method of anaesthesia. GS Mohammed reported some slight differences in parotid gland resection surgery when three distinct methods were used: superficial cervical plexus block, auricular–temporal nerve block, and cervical retrolaminar block [20]. However, nerve block anaesthesia is disadvantageous in terms of high technical requirements, further limiting its adoption in clinical settings. R Girotto reported a regional anaesthesia method that does not involve block anaesthesia [21]. We also employed this regional anaesthesia method in our study and achieved complete analgesia by combining nitrous oxide inhalation for sedation and analgesia. During surgery, the patient was satisfied with the anaesthesia effect and successfully completed the surgery. There were no changes to the anaesthesia method. However, further research is needed to refine the specific dosage and duration of nitrous oxide use.

In our study, a total of seven patients underwent total parotidectomy under local anaesthesia. The surgical time and complication rate were similar to those reported in K. Shahid's study [22]. Owing to advancements, local anaesthesia is no longer off limits for total parotidectomy. This development brings new hope to patients who are not suitable for general anaesthesia. Notably, more patients with malignant tumours undergo surgery under general anaesthesia. This is because, in some patients with parotid squamous cell carcinoma, local anaesthesia cannot be used. We need to perform free skin flap transplantation at the same time to repair the defect. The prolonged operation time and surgical trauma make it impossible to perform this procedure under local anaesthesia combined with conscious sedation. At least in the short term, general anaesthesia is required for this type of patient.

We did not perform facial nerve function testing during surgery, which might have adverse effects on facial nerve protection. M. Zieliński's research also highlights the role of facial nerve monitoring in preventing transient facial nerve injuries [23]. However, we believe that the use of facial nerve function testing under local anaesthesia remains controversial. Attaching a facial nerve detector while the patient is conscious can induce varying levels of anxiety and discomfort, potentially detracting from the quality of care. In our research, the

incidence of complications such as transient facial nerve injury, middle ear nerve injury, haematoma, and Frey's syndrome with local anaesthesia was lower than that with general anaesthesia. This could be attributed to smaller tumour volumes typically treated under local anaesthesia or to the precision of procedures under local anaesthesia. In any case, this issue merits further investigation.

The question of whether local anaesthesia can be universally applied in parotid gland tumour surgeries remains a pertinent topic for discussion. In our study, we believe that local anaesthesia is feasible for surgery for benign tumours of the parotid gland. However, in cases involving extensive resection of malignant tumours and simultaneous soft tissue reconstruction, the use of local anaesthesia should be avoided. This is because vascularized free skin flap transplantation repair surgery involves multiple surgical areas. The surgical time is long and surgical trauma is extensive. This repair cannot be completed under local anaesthesia. In such highly invasive surgeries, general anaesthesia is required.

Our study is a retrospective study, which has inherent limitations. Our conclusions may be susceptible to selection bias. We tried our best to avoid extensive intervention in the patients' selection of anaesthesia method, but this is sometimes unavoidable. Tumour size and nature are confounding factors that cannot be ruled out, and both patients and doctors need to consider the impact of these factors. To mitigate this interference and further investigate the potential advantages of local anaesthesia, it is necessary to conduct prospective clinical studies.

Conclusion

It is feasible to perform parotid gland tumour resection under local anaesthesia with conscious sedation with the exception of technically complicated cases requiring free vascularised skin flaps and malignancies. Compared with general anaesthesia, this approach does not increase the risk of complications or surgical trauma and can reduce the risk of anaesthesia-related complications. This is beneficial for expanding surgical treatment indications, allowing some patients who cannot tolerate general anaesthesia to also receive treatment.

Acknowledgements
This work was supported by Science and Technology Research Project of Henan Provincial Department of Science and Technology (LHGJ20230925).

Author contributions
Conceptualization: WL, ZH, XZ, SL; Data curation: WL, FY, SL; Formal analysis: WL, HS, SL; Funding acquisition: XZ, XZ; Investigation: WL, HS; Methodology: WL, HS, XZ; Project administration: WL, XZ; Software: XZ, SL; Resources: XZ, PZ, SL; Supervision: XZ, PZ; Writing – original draft: SL, HS; Writing – review & editing: WL, SL, ZH, XZ. All authors read and approved the final manuscript.

Funding
This work was supported by Science and Technology Research Project of Henan Provincial Department of Science and Technology (LHGJ20230925).

Data availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study was approved by the Human Research Ethics Committee of Xuchang Central Hospital (2020-06-003) and was performed in accordance with the tenets of the Declaration of Helsinki. Informed consent was waived by the Human Research Ethics Committee of Xuchang Central Hospital because of the retrospective nature of the fully anonymized data.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Received: 19 September 2024 / Accepted: 9 December 2024
Published online: 21 December 2024

References

1. Lee DH, Jung EK, Lee JK, Lim SC. Comparative analysis of benign and malignant parotid gland tumors: a retrospective study of 992 patients. Am J Otolaryngol. 2023;44(2):103690.
2. Zoccali F, Cialente F, Colizza A, Ralli M, Greco A, de Vincentiis M. Clinico-histopathological review of 255 patients who underwent parotidectomy for pleomorphic adenoma: a 10-year retrospective study—a proposal for an optimal diagnostic and therapeutic algorithm for patients with recurrent pleomorphic adenoma. Eur Arch Otorhinolaryngol. 2023;280(7):3329–35.
3. Tesseroli MAS, Zasso FB, Hepp H, Priante AVM, Filho ALLM, Sanabria A. Parotidectomy under sedation and locoregional anesthesia with monitoring of brain activity. Head Neck 2017;39(4).
4. Radkowski P, Oniszczuk H, Fadrowska-Szleper M, Onichimowski D. Decoding the neurological sequelae of General Anesthesia: a review. Med Sci Monitor: Int Med J Experimental Clin Res. 2024;30:e942740–942741.
5. Chang M, Coughran A, Lee YJ, Collins J, Sirjani D. Retrograde parotidectomy under local anesthesia for benign, malignant, and inflammatory lesions. Am J Otolaryngol 2019;40(2):152–5.
6. Cheung SH, Kwan WYW, Tsui KP, Chow TL. Partial parotidectomy under local anesthesia for benign parotid tumors - an experience of 50 cases. Am J Otolaryngol 2018:S0196070918300310.
7. Liu S, Li W, Wang Y, Huang Z, Zhang X. Efficacy of digital zoning design for the resection of benign parotid gland tumor. J Stomatology Oral Maxillofacial Surg 2024;125(5S2):101904.
8. Harris M, Chung F. Complications of general anesthesia. Clin Plast Surg. 2013;40(4):503–13.
9. Schlesinger T, Becke-Jakob K, Eich C, Gottschaldt U, Kretz F, Kroesche J, Kranke P, Höhne C. Postoperative nausea and vomiting-recommendations for its prevention and therapy in paediatric medicine. Die Anaesthesiologie 2023;72(1):37–47.
10. Mikstacki A, Zakerska-Banaszak O, Skrzypczak-Zielinska M, Tamowicz B, Szalata M, Slomski R. Glutathione S-transferase as a toxicity indicator in general anesthesia: genetics and biochemical function. J Clin Anesth. 2015;27(1):73–9.
11. Buonanno P, Marra A, Iacovazzo C, Vargas M, Coviello A, Squillacioti F, Nappi S, de Siena AU, Servillo G. Impact of ventilation strategies on pulmonary and cardiovascular complications in patients undergoing general anaesthesia for elective surgery: a systematic review and meta-analysis. Br J Anaesth 2023;131(6):1093–101.
12. Locke, Maren C, Davis, Jeremy C, Joseph, Ross, Love W. Assessing the outcomes, risks, and costs of local versus general anesthesia: a review with implications for cutaneous surgery. J Am Acad Dermatol. 2018;78(5):983–983.
13. Douglas C, Elise B, Ruby Blythe C, Jess H, Alan P. B: General Anesthesia Compared With Non-GA in Endovascular Thrombectomy for Ischemic Stroke: A Systematic Review and Meta-analysis of Randomized Controlled Trials. *Neurology* 2023.

14. Thomas G, Christoph E, Defosse JM, Olger K, Alberto LP, Julika M, Aris K, Erich S. Patients' satisfaction with local and general anaesthesia for video-assisted thoracoscopic surgery—results of the first randomized controlled trial PASSAT. Eur J Cardiothorac Surg 2023(2):2.
15. Kadletz L, Grasl S, Grasl MC, Perisanidis C, Erovic BM. Extracapsular dissection versus superficial parotidectomy in benign parotid gland tumors: the Vienna Medical School experience. Head Neck. 2017;39(2):356–60.
16. Taniuchi M, Terada T, Kawata R. Fine-needle aspiration cytology for parotid tumors. Life. 2022;12(11):1897.
17. de Sousa Lacerda WHM, de Sousa Carvalho G, de Santana BWJ, da Silva WR, de Albuquerque Borges M, de Souza LB, Sobral APV, da Silva LP. Malignant salivary gland tumors: agreement between fine needle aspiration biopsy, incisional biopsy and final histopathological diagnostic. Medicina oral patología oral y cirugía Bucal. 2024;29(1):e111.
18. Pastorello R, Rodriguez E, McCormick B, Calsavara V, Chen L, Zarka M, Schmitt A. Is there a role for frozen section evaluation of parotid masses after preoperative cytology or biopsy diagnosis? Head Neck Pathol 2021:1–7.
19. Varazzani A, Tognin L, Bergonzani M, Ferri A, Ferrari S, Poli T. Diagnosis and management of parotid Gland Cancer with Focus on the role of preoperative fine-needle aspiration cytology: a 10-Year-long retrospective study with 5-Year Follow-Up. J Oral Maxillofac Surg. 2023;22(2):373–80.
20. Mohammed GS, Mazy AM, El-Ebahnasawy NS, Mohammed MN. Efficacy of superficial cervical plexus block versus cervical retrolaminar block both combined with auriculotemporal nerve block in parotid surgeries. Annals Med Surg. 2022;75:103445.
21. Girotto R, De Feudis F, Balercia P. Partial parotidectomy under local Anaesthesia without Regional Block assisted by Electromyographic facial nerve Monitoring-A Case Report. Annals Maxillofacial Surg. 2023;13(1):127–9.
22. Shahid K, Siddiqui BK, Tahir MH, Ayub SB, Siddiqui AK. Total parotidectomy under local anesthesia: a novel technique. J Coll Physicians Surgeons–Pakistan: JCPSP. 2007;17(2):116.
23. Zieliński M, Sowa P, Adamczyk-Sowa M, Szlęzak M, Misiołek M. Prospective assessment of intraoperative facial nerve monitoring in patients undergoing partial parotidectomy. Biomed Res Int. 2022;2022(1):3318175.

Publisher's note