

Maxillofacial complications after parotidectomy: a systematic review

Complicações maxilofaciais pós parotidectomia: uma revisão sistemática

Complicaciones maxilofaciales tras parotidectomía: una revisión sistemática

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ABSTRACT

There is significant concern regarding parotidectomy due to its possible complications and diagnoses, making precise knowledge of anatomy extremely important, so that there is an understanding of the pathological processes that occur that can cause limitations in mouth opening and consequent vascular paralysis and salivary fistulas, such as among other complications. The present study aimed to evaluate the technical restrictions and complications of parotidectomy in the treatment of variations of benign and malignant conditions related to the plexus of maxillofacial structures. A systematic review of articles with PRISMA systematization was carried out from 2021 to 2024. Using Pubmed as a basis, English, Portuguese and Spanish inclusion criteria. with descriptor “Parotidectomy, Maxillofacial and Prevalence”. Studies demonstrate that conventional superficial parotidectomy and partial superficial parotidectomy surgery is very effective in treating some of these pathological changes, and highlight the importance of the professional establishing an accurate diagnosis and knowing the correct technique, in order to indicate this therapeutic modality for patients with real indication. From this, incidences and predictive factors of parotidectomy complications were found. As it is a surgical therapy, some professionals give priority to conservative parotidectomy treatments; if there are no promising results, start treatment with radical parotidectomy.

Keywords: parotidectomy, maxillofacial complications, surgery.

RESUMO

Existe uma preocupação significativa em relação parotidectomia devido suas possíveis complicações e diagnósticos, se tornando algo extremamente importante o conhecimento preciso da anatomia, para que haja entendimento dos processos patológicos ocorridos que podem causar limitação na abertura bucal e consequente paralisia facial e fístula salivar, como entre outras complicações. O presente estudo teve como objetivo avaliar as indicações técnicas e complicações da parotidectomia no tratamento de variáveis condições benignas e malignas relacionadas plexo de estruturas maxilofaciais. Foi realizada uma revisão sistemática de artigos com sistematização PRISMA no período de 2021 a 2024. usando como base o Pubmed, critérios de inclusão inglês, português e espanhol. com descritor “Parotidectomy, Maxillofacial e Prevalence”. Os estudos demonstram que a cirurgia de parotidectomia superficial convencional e parotidectomia superficial parcial é muito eficaz no tratamento de algumas dessas alterações patológicas, e ressaltam a importância do profissional estabelecer um diagnóstico preciso e conhecer a fundo a técnica correta, para assim indicar essa modalidade terapêutica para pacientes com real indicação. A partir disso, foram encontradas incidências e fatores preditivos das complicações da parotidectomia. Por ser uma terapia cirúrgica, alguns profissionais dão

prioridade aos tratamentos de parotidectomia conservadores, caso não haja resultados promissores, iniciam o tratamento com parotidectomia radical.

Palavras-chave: parotidectomia, complicações maxilofaciais, cirurgia.

RESUMEN

Existe una gran preocupación con relación a la parotidectomia debido a sus posibles complicaciones y diagnósticos, tornando extremamente importante el conocimiento preciso de la anatomía, para que haya una comprensión de los procesos patológicos que ocurren y que pueden causar limitaciones en la abertura bucal y consecuente parálisis vascular y fístulas salivales, como entre otras complicaciones. El presente estudio tuvo como objetivo evaluar las restricciones técnicas y complicaciones de la parotidectomía en el tratamiento de variaciones de condiciones benignas y malignas relacionadas con el plexo de estructuras maxilofaciales. Se realizó una revisión sistemática de artículos con sistematización PRISMA desde 2021 hasta 2024. Utilizando Pubmed como base, criterios de inclusión en inglés, portugués y español. con el descriptor "Parotidectomy, Maxillofacial and Prevalence". Los estudios demuestran que la cirugía de parotidectomía superficial convencional y parotidectomía superficial parcial es muy eficaz en el tratamiento de algunas de estas alteraciones patológicas, y destacan la importancia de que el profesional establezca un diagnóstico preciso y conozca la técnica correcta, para indicar esta modalidad terapéutica en pacientes con indicación real. A partir de esto, se encontraron incidencias y factores predictivos de complicaciones de la parotidectomía. Por tratarse de una terapia quirúrgica, algunos profesionales dan prioridad a los tratamientos conservadores de parotidectomía; si no hay resultados promisorios, inician el tratamiento con parotidectomía radical.

Palabras clave: parotidectomía, complicaciones maxilofaciales, cirugía.

1 INTRODUCTION

Parotid gland surgery is a common procedure performed to treat a variety of benign and malignant conditions. This intervention, however, can be associated with various complications, especially those affecting maxillofacial structures such as the facial nerve and adjacent salivary structures. Complications such as facial paralysis, Frey's syndrome, sialocele and salivary fistula are frequently reported concerns following parotidectomy, significantly impacting patients' quality of life in the short and long term (Lambiel et al., 2021; Mashrah et al., 2021; Al-Aroomi et al., 2021; Zoccali et al., 2023).

In addition, studies have investigated long-term outcomes and quality of life after parotidectomy for benign diseases, with an emphasis on maxillofacial complications and their long-term prevalence. Given the importance of these complications and their influence on patients' health and well-being, there is a growing need to better understand their incidence, risk factors and prevention and management strategies (Plath et al., 2022).

Therefore, this study aims to review and synthesize the existing literature on the prevalence of maxillofacial complications following parotidectomy, providing a comprehensive overview of this topic and highlighting areas for future research and clinical interventions.

2 METHODOLOGY

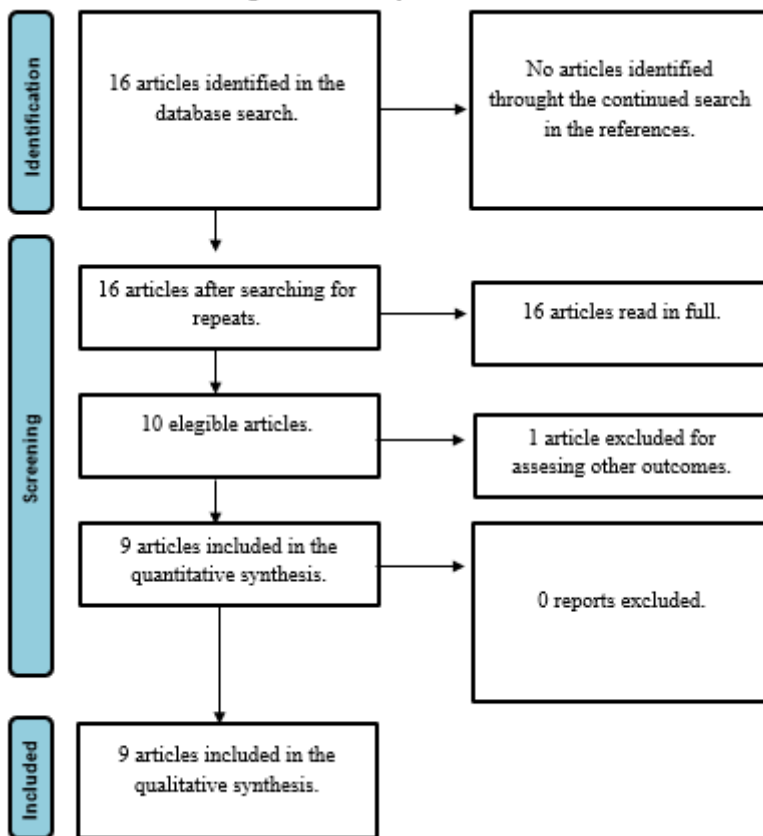
This study constitutes a detailed analysis of the existing literature, using rigorous methods to identify and evaluate the relevant studies. The focus of this review was to investigate the possible maxillofacial complications following parotidectomy. After delimiting the topic and formulating the research question, studies were collected using specific health descriptors, including Parotidectomy, Maxillofacial and Prevalence, through the PubMed database, as well as PRISMA systematization to enhance the results.

The methodological stages included the definition and application of inclusion and exclusion criteria, as well as the bibliographic survey according to the databases mentioned, culminating in the synthesis of the review. The inclusion criteria included scientific articles published entirely in English, Portuguese or Spanish between 2021 and 2024. In turn, the exclusion criteria included studies that were not directly related to the proposed topic, as well as course completion papers, book chapters, technical reports, conference proceedings, monographs, incomplete articles or publications dating back more than a decade and in languages other than those mentioned in the inclusion criteria.

3 RESULTS

In the first phase, 16 articles were identified in the database search, with no articles identified in the references. The full-text analysis was carried out on 16 articles, 10 of which were selected and 1 excluded because it did not present the outcome of the topic. After a thorough search of the database, 9 articles were chosen that allowed a meticulous assessment of maxillofacial complications following parotidectomy. Figure 1 shows the flowchart of the article selection process. Table 1 summarizes the characteristics of the studies included in this review.

Figure 1. PRISMA systematization flowchart.



Source: authors.

Table 1. Description of the characteristics of the prospective study, literature review and retrospective study articles included in this review.

Title	Author	Delineation	Outcome
Minor Parotidectomy Complications: A Systematic Review	Silva et al., 2020	Literature review	Minor complications from parotidectomy are more common than you might think and are related to specific factors. Implants result in complications such as hematoma, sialoceles or salivary fistula in the wound. Sialoceles and fistula are more common in less extensive surgeries, while hematoma, infection, flap necrosis and aesthetic issues are more serious in more extensive resections.
Surgical interventions for management of benign parotid tumors: A systematic review and network meta-analysis	Mashrah et al., 2021	Literature review	The current study found no significant difference between different parotid surgery techniques in relation to tumor recurrence. DCE showed a reduction in morbidity without compromising oncological treatment, but should only be used by experienced surgeons for specific tumors. Complications such as TFW and Frey's syndrome seem to increase with the extent of surgery, while others such as PFP, salivary

			fistula and sialoceles are not related to the extent of parotid surgery.
Comparison of postoperative complications and facial nerve recovery rates after conventional and partial superficial parotidectomy of benign parotid tumours: a prospective study	Al-Aroomi et al., 2020	Prospective study	PSP is a conservative procedure with less morbidity for the facial nerve, as well as requiring less surgery time and hospitalization compared to CSP. However, both procedures had comparable rates of facial nerve recovery.
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	Zoccali et al., 2023	Prospective study	An accurate preoperative assessment is important in order to select the ideal treatment aimed at radical removal of the tumor, reducing complications and recurrences. A complete clinical assessment is recommended, including anamnesis, ENT physical examination, ultrasound and, if possible, CEUS. If a pleomorphic adenoma is suspected, FNAB followed by preoperative MRI is suggested. Long-term follow-up is recommended to detect recurrences, especially in large parotid adenomas. The aforementioned strategies aim to optimize the surgical outcome and reduce intra- and post-operative risks, with suggestions for additional treatments in the event of recurrence.
Long-term outcomes and quality of life following parotidectomy for benign disease	Plath et al., 2021	Prospective study	Patients identified hypoesthesia and fear of revision surgery as the main long-term concerns, while facial paralysis was seen as less significant. Hypoesthesia improved over time in the study group and did not affect quality of life. Therefore, hypoesthesia should be addressed when informing patients about the procedure.
Evaluation of the effectiveness of superficial parotidectomy and partial superficial parotidectomy for benign parotid tumours: a meta-analysis	Liu et al., 2023	Literature review	The results of this study show that partial superficial parotidectomy (PSP) has advantages over superficial parotidectomy (SP) in terms of postoperative complications in benign parotid tumors. PSP has a lower incidence of temporary facial paralysis, permanent facial paralysis and Frey's syndrome, as well as a shorter duration of surgery. However, due to the limitations of the study, more high-quality research is needed to fully explore the role of PSP in postoperative effects in patients with benign parotid tumors.
Acellular dermal matrix for prevention of Frey's syndrome after superficial parotidectomy of benign tumors	Al-Aroomi et al., 2021	Prospective study	In summary, ADM has been shown to be effective in reducing post-operative Frey's syndrome after superficial

			parotidectomy. It is a clinically simple procedure and can result in good aesthetics for patients. The study highlights the need for prolonged follow-up and indicates that a period of around 18 months is adequate to observe the development of Frey's syndrome.
Clinical outcomes and costeffectiveness of superficial parotidectomy versus extracapsular dissection of the parotid gland: a single-centre retrospective study of 161 patients	Vanroose et al., 2023	Prospective study	In this study, the extracapsular dissection technique showed better results and a lower incidence of complications compared to the superficial parotidectomy technique in selected cases. After careful preoperative assessment with tests such as FNAB, ultrasound, MRI and clinical evaluation, extracapsular dissection is a suitable option for parotidectomy in well-indicated and correctly located tumors, especially in well-defined and mobile superficial benign lesions, mainly in the posterior lower lobe. Surgeons should be able to alternate between the two surgical techniques as necessary during surgery, especially when more extensive debulking is indicated.
Therapeutic neck dissection in head and neck melanoma patients: Comparing extent of surgery and clinical outcome in two cohorts	Berger et al., 2020	Prospective study	This study does not recommend routine parotidectomy and (MRND) in melanoma patients who have undergone lymph node dissection for macroscopic (palpable) nodal disease.

Caption: Partial Superficial Parotidectomy (PSP); Conventional Superficial Parotidectomy (CSP); Acellular Dermal Matrix (ADM); Extracapsular Dissection (ECD); Temporary (TFW); Permanent (PFP); Contrast Ultrasound CEUS; Fine Needle Aspiration Cytology (FNAC); Modified Radical Cervical Drainage (MRND). Source: authors.

4 DISCUSSION

Al-Aroomi et al. (2021) compared postoperative complications and facial nerve recovery rates between conventional superficial parotidectomy (SSP) and partial superficial parotidectomy (PSP) as a surgical treatment for benign parotid tumors. The authors state that surgery for benign parotid tumors has undergone significant changes over the last century. With the emergence of minimally invasive surgery, there has been a change in approach, prioritizing more conservative techniques such as partial superficial parotidectomy (PSP) or even extracapsular dissection. PSP, compared to conventional superficial parotidectomy (PSC), is a less invasive intervention, not only reducing surgical time, but also decreasing the risk of damage to the facial nerve, since fewer branches of the nerve are dissected. It is widely

recognized that the risk of nerve damage (the most common post-surgical complication) is directly related to the extent of nerve dissection. In addition, the study confirmed a lower incidence of temporary nerve palsy after PSP than after SSP. Another common complication reported by the authors after parotid surgery is Frey's Syndrome, which is characterized by dermal flushing and sweating of the skin overlying the parotid region. The study revealed that the syndrome, assessed objectively, was observed in 23.6% (13/55) of patients after 1 year of follow-up.

The study carried out by Lambiel et al. (2020) included a large number of studies and, consequently, patients, in order to assess the incidence and predictive factors of the minor complications of parotidectomy. Among these were: sialoceles, salivary fistula, skin anesthesia, wound complications (infection, sagging, hematoma, seroma and skin flap necrosis), late adverse healing and local deformity with skin depression. In general, sialoceles and salivary fistula appear more frequently after less extensive surgeries, while hematomas, wound infections, tissue necrosis and aesthetic considerations are aggravated when more extensive resections are performed. The factors associated with healing problems and post-parotidectomy numbness are more straightforward - better, less obvious scars can be achieved with a facelift incision and numbness is related to the sacrifice of the greater auricular nerve.

Subsequently, Mashrah et al. (2021) set out to determine, by means of a network meta-analysis, whether the extent of surgical resection of benign parotid tumors is associated with an increased risk of postoperative complications. This comparative analysis evaluated various surgical interventions for benign parotid tumors in order to identify the most effective approach that balances tumor recurrence rates with postoperative complications. The rates of tumor recurrence, temporary facial nerve weakness (TFW), permanent facial nerve paralysis (PFP), Frey's syndrome (FS), sialoceles and salivary fistula were used as predictors to compare different surgical procedures: Enucleation; Extracapsular Capsular Dissection (ECD); Superficial Parotidectomy (PSP); Superficial Parotidectomy (SP); Total Parotidectomy (TP). No significant difference was found between the techniques of enucleation, extracapsular capsular dissection (ECD), superficial parotidectomy (PSP) and total parotidectomy (TP) in relation to tumor recurrence. ECD was associated with a reduction in morbidity without compromising oncology, and is recommended for specific parotid tumors and when performed by an experienced surgeon. The incidence of temporary facial weakness (TFW) and Frey's syndrome seems to increase with the extent of parotid surgery, while the incidence of permanent facial paralysis (PFP), salivary fistula and sialoceles does not seem to be related to the extent of parotid surgery. However, the authors identify methodological challenges that permeate comparative

studies in the field of parotid surgery, highlighting the importance of addressing them in order to improve the quality of the available evidence. These challenges include Difficulties in conducting randomized clinical trials (RCTs), which are an important source of evidence, but whose implementation in parotid surgery is complex; Lack of reporting of important factors, such as pathological entity, postoperative follow-up, size and location of the tumor, and level of expertise of the surgeons, which can significantly influence the results of the studies; Need for a homogeneous sample of patients, with similar characteristics of tumor, location, pathology and follow-up, to allow an adequate comparison between different surgical approaches, minimizing bias; Lack of description of the method of facial nerve dissection (antegrade or retrograde) in most of the included studies, which can have a direct impact on the incidence of postoperative complications; Lack of details on the method of postoperative assessment of facial nerve weakness in most of the included studies, which compromises the understanding of outcomes related to nerve function after parotid surgery. These methodological aspects need to be considered and addressed in future research to strengthen the evidence base and adequately inform clinical practice in the field of this type of surgery.

The study by Zoccali et al. (2023) retrospectively analyzed the surgical management of patients diagnosed with pleomorphic adenoma of the parotid gland, with an emphasis on the recurrence rate and complications associated with surgery. The aim was to propose an optimized diagnostic and therapeutic algorithm for patients with recurrence of this type of tumor. Emphasizing all the aforementioned articles, the work in question claims that the choice of surgical approach is influenced by several factors, including the location and size of the adenoma, the availability of technical resources and the surgeon's experience. During follow-up, it was observed that 37.6% of patients had transient facial paralysis, while 2.7% developed permanent facial nerve paralysis. In addition, 1.6% of patients manifested a salivary fistula, 1.6% had an episode of post-operative bleeding and 2.3% exhibited Frey's Syndrome.

Plath and his team (2022) analyzed the long-term impact of parotidectomy on the quality of life of patients undergoing surgical treatment. The POI-8 (Parotidectomy Outcome Inventory) questionnaire was used in 199 patients who underwent partial or total parotidectomy due to benign disease between 2003 and 2006. Patients undergoing surgical treatment reported hyposensitivity and fear of the need for revision surgery as the main long-term harms, while facial paralysis was considered a minor problem.

The main purpose of the study by Al-Aroomi et al. (2021) was to examine how effective the adherence membrane device (ADM) can be as a physical barrier to prevent DES after superficial parotidectomy to remove benign tumors. By evaluating several studies, the author

concluded that the use of ADM is effective and clinically simple to perform, as well as providing cosmetic results, in addition to highlighting the need for post-operative follow-up since the peak appearance was around 18 months.

Vanroose et al. (2023) compared the clinical results of superficial parotidectomy with extra capsular dissection of the parotid gland. This study used 161 patients and considered certain limitations, such as the failure to identify recurrence, probably caused by a lack of long-term follow-up, and the failure to include cases of total parotidectomy. The result was that the extracapsular dissection technique achieved better clinical results than the superficial parotidectomy technique, highlighting the importance of the surgeon knowing and being able to alternate between the two techniques.

In the article by Liu et al. (2022) 23 studies comparing superficial parotidectomy and partial superficial parotidectomy for benign parotid tumors were analyzed in order to compare the effectiveness of the two techniques. The analysis of these studies led to the conclusion that the surgical approach to PSP reduced the incidence of Frey's syndrome and facial nerve paralysis with a shorter operative time, but no significant differences were observed between the techniques in cases of postoperative salivary fistula, sialocele, hematoma and tumor recurrence in patients.

The study by Berger et al. (2021) has as its primary objective the verification of a possible difference in efficacy between the comprehensive cervical dissection approach, a modified radical cervical dissection (MRND) including elective parotidectomy. With the analysis of the techniques, the author concludes not to support the practice of elective parotidectomy in melanoma patients undergoing lymph node dissection for macroscopic nodal disease from the analysis of two different neck dissection protocols in similar patient cohorts from two specialized melanoma centers in the Netherlands.

5 CONCLUSION

In view of the significance of parotidectomy, which is a crucial surgical intervention for the treatment of diseases of the parotid gland, such as tumors, cysts and infections. Although there may be some adverse effects, such as swelling and pain, most patients recover well after the surgical procedure. The preservation of facial nerve tissue is fundamental to maintaining proper facial function. Just as the choice of surgical technique depends on the individual characteristics of the patient and the disease in question. It is therefore crucial that professionals

are familiar with this therapeutic approach and understand it, applying it when necessary to patients, offering a good prospect of recovery and quality of life for patients.

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