

Evaluation of postoperative complications in elderly patients submitted to parotidectomy.

Avaliação das complicações pós-operatórias em pacientes idosos submetidos à parotidectomia.

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ABSTRACT

Objective: to evaluate the most incident histological subtypes and the main postoperative complications in elderly patients with parotid tumors submitted to parotidectomy. **Methods:** we conducted a retrospective study with 57 elderly patients submitted to parotidectomy from 2003 to 2017, at the São José County Hospital of Joinville, Santa Catarina, Brazil. **Results:** thirty-three (57.9%) patients had benign tumors, the most frequent being Warthin's tumor, and 17 (29.8%), malignant tumors, squamous cell carcinoma being the most frequent. Seven patients (12.3%) presented clinical complications, arterial pressure instability and respiratory complications being the most frequent, in four (7%) and three (5.3%) cases, respectively. Thirteen (22.1%) patients presented complications related to the surgical wound, hematoma and wound infection being the most frequent, with six (10.5%) cases each. Twenty-four (42.1%) patients had some degree of facial nerve dysfunction in the postoperative period, Brackman-House grade III being the most frequent, in 11 cases (19.3%). Surgical time and lymphadenectomy were associated with clinical complications. The main variables that showed an association with surgical complications were tumor size, longer surgical time, reoperation, and perioperative crystalloid infusion volume. **Conclusion:** parotid neoplasms present a differentiated profile in the elderly population, especially Warthin's tumor and squamous cell carcinoma. Hematoma and infection of the operative wound and facial nerve lesions were the most prevalent complications in the postoperative period.

Keywords: Parotid Gland. Neoplasms. Parotid Neoplasms. Aged. Postoperative Period.

INTRODUCTION

About 80% to 85% of salivary gland tumors occur in the parotid, corresponding to approximately 3% to 7% of all head and neck neoplasms. About 25% of them are malignant¹ and surgery is the main form of treatment¹⁻³.

The elderly population -aged 60 and over- is growing and Brazil will be the sixth country with the largest elderly population in the world by 2025, according to the World Health Organization⁴. Thus, an increasing number of elderly people will need surgical treatment, with a direct impact on the health system expenses. Old age has physiological peculiarities that, associated with comorbidities, represent a challenge for surgical decision-making, as well as for postoperative management.

The objective of this study was to evaluate the histological subtypes of parotid tumors most incident in this age group, as well as the main complications in the postoperative period in elderly patients submitted to parotidectomy.

METHODS

We conducted a retrospective cohort study of analysis of medical records of all patients aged 60 years or older submitted to parotidectomy from 2003 to 2017. We excluded patients with incomplete medical records from the study. The type of surgery performed was chosen based on the preoperative diagnosis, clinical presentation of the tumor, fine needle aspiration (FNA) and radiological examinations. All patients had the cervicomastoideofacial incision as standard

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surgical access. Parotidectomy was classified as partial, superficial or total, based on the resected lobe and the extent of facial nerve dissection. Partial parotidectomy, considered as any procedure less extensive than superficial parotidectomy, does not imply dissection of the facial nerve. Superficial parotidectomy involves resection of the entire superficial lobe and dissection of all branches of the facial nerve. Total parotidectomy involves dissection of the entire facial nerve, with total removal of the parotid tissue from both the deep and the superficial lobe. In malignant tumors, cervical exploration for lymphadenectomy was performed in cases where there was lymph node enlargement in the preoperative evaluation, in those with positive FNA or with imaging tests suggestive of lymphadenomegaly. The surgical sites were drained and maintained with aspiration. All cases had histopathological confirmation. The risk of complication due to facial nerve palsy was assessed by the House-Brackmann scale. We evaluated clinical and surgical complications in the immediate postoperative period.

We used the Chi-square test of independence for the associations between characteristics and outcomes. We used the Mann-Whitney test to compare the groups in relation to quantitative (numerical) variables. The level of significance was <0.05 . We performed data analysis using the Microsoft Excel 2016 software and the EpiInfo software version 7.

The study complied with the Code of Ethics of the World Medical Association (Declaration of Helsinki) and was approved by the Ethics in Research Committee of the São José County Hospital of Joinville, Santa Catarina, Brazil, under the number 80719317.3.0000.5362.

RESULTS

In the period from 2003 to 2017, 194 parotidectomies were performed, of which 101 in

patients younger than 60 years. We excluded 30 patients due to incomplete information in their medical records. Thus, we studied 57 patients, of whom 38 (66.7%) were male (2:1 male:female ratio). The mean age was 67.53 ± 6.57 years (60 to 85 years). Of the 57 patients, 34 (59.65%) had a history of smoking, and the main comorbidities were systemic arterial hypertension (SAH) in 27 (47.37%) and diabetes mellitus (DM) in ten (17.54%). Seven (12.28%) patients had a history of neoplasms. The majority (84.2%) were classified as ASA II (American Society of Anesthesiologists) in the preanesthetic evaluation (Table 1).

Ultrasonography was the most performed exam and the mean lesion size was 2.95 ± 1.11 cm. FNA showed a sensitivity of 50%, specificity of 100%, Positive Predictive Value (PPV) of 100% and Negative Predictive Value (NPV) of 83.33% in relation to the diagnosis of malignant neoplasias (Table 1).

Superficial parotidectomy was the most frequent procedure, in 38 (66.7%) cases, followed by partial parotidectomy in ten (17.5%) and total in nine (15.8%). The mean surgical time was 219.33 ± 88.99 minutes. In nine (15.8%) patients, other procedures were performed, lymphadenectomy (19.3%) being the most frequent. Eleven (19.3%) patients had surgical complications, notably the need for ligation of the external jugular vein in five (8.77%) cases. Only three (5.3%) patients required intraoperative transfusion (Table 2).

Thirty-three (57.9%) patients had benign tumors, the most frequent being Warthin's tumor in 20 (35.1%), followed by pleomorphic adenoma in 12 (21%) and myoepithelioma in one (1.8%). Seventeen (29.8%) were malignant tumors, squamous cell carcinoma being the most frequent, with eight (14%) cases, followed by pleomorphic ex-adenoma carcinoma, with two (3.5%), and salivary duct carcinoma, with two (3.5%) cases. There

Table 1. Patients' preoperative clinical characteristics.

Characteristics	Number of patients (n=57)
Demographic characteristics	
Male	38 (66.7%)
Age (years)	67.53±6.57
60-65	23 (40.4%)
66-70	15 (26.3%)
71-75	11 (19.3%)
76-80	4 (7%)
81-85	4 (7%)
Comorbidities	
Smoking	34 (59.65%)
Diabetes	10 (17.54%)
Hypertension	27 (47.37%)
COPD*	5 (8.77%)
Cardiovascular ^a	8 (14.04%)
Cancer ^b	7 (12.28%)
Psychiatric ^c	5 (8.77%)
ASA**	
1	3 (5.3%)
2	48 (84.2%)
3	6 (10.5%)
Tumor characteristics	
Image Exam	
Ultrasonography	17 (29.82%)
CT	13 (22.81%)
MRI***	2 (3.5%)
FNA#	
Indefinite/no diagnosis	14 (24.6%)
Benign	17 (29.8%)
Malignant	3 (5.3%)
FNA-diagnostic test	
Sensitivity (%)	50%
Specificity (%)	100%
Positive predictive value (%)	100%
Negative predictive value (%)	83.33%

* COPD, chronic obstructive pulmonary disease; ^a transient ischemic attack, stroke, myocardial infarction, heart failure, peripheral arterial obstructive disease; ^b gastric adenocarcinoma, colon adenocarcinoma, gastric Lymphoma, breast cancer; ^c mood disorder/anxiety; ** ASA, American Society of Anesthesiologists; MRI, magnetic resonance imaging; # FNA, fine needle aspiration.

Table 2. Details of the procedures and perioperative complications.

Characteristics	Number of patients (n=57)
Surgical time (min±SD*)	(219.33±88.99)
Volume (ml±SD*)	(2175.44±1883.89)
Combined procedure	14 (24.6%)
Biopsy	3 (5.3%)
Lymphadenectomy	11 (19.3%)
Tracheostomy	3 (5.3%)
Thyroidectomy	1 (1.8%)
Mandibulectomy with reconstruction	2 (3.5%)
Parapharyngeal tumor excision	2 (3.5%)
Parotidectomy	
Partial	10 (17.5%)
Superficial	38 (66.7%)
Total	9 (15.8%)
Right Side	33 (57.9%)
Complications	11 (19.3%)
External jugular vein ligation	5 (8.77%)
Facial vein ligation	2 (3.51%)
Facial artery ligation	1 (1.75%)
Sacrifice of facial nerve due to invasion	5 (8.77%)
External carotid ligation due to invasion	1 (1.75%)
Blood transfusion	3 (5.3%)

* SD, standard deviation.

was an increased incidence of malignant tumors with increasing age, the incidences of benign and malignant tumors becoming similar over 70 years, as shown in figure 1. The mean size of the surgical specimen was 5.92 ± 1.85 cm (Table 3).

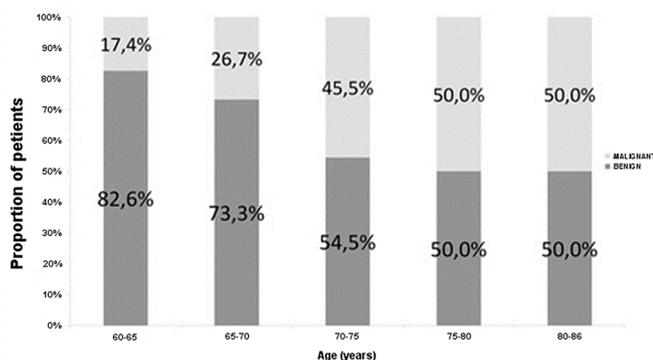


Figure 1. Distribution of benign and malignant tumors according to age group.

The mean length of hospital stay was 4 ± 3.92 days, and only two (3.5%) patients required postoperative ICU admission. Seven patients (12.3%) presented clinical complications, arterial pressure instability and respiratory complications being the most frequent, in four (7%) and three (5.3%) cases, respectively. There were no deaths during hospitalization. Thirteen (22.1%) patients presented complications related to the surgical wound, bleeding/bruising and wound infection being the most frequent, with six (10.5%) cases each. Twenty-four (42.1%) patients had some degree of facial nerve dysfunction in the postoperative period, Brackman-House grade III being the most frequent, in 11 cases (19.3%) (Table 4).

Table 3. Characteristics of surgical specimens and histopathology.

Characteristics	Number of patients (n=57)
Non neoplastic*	7 (12.3%)
Benign	33 (57.9%)
Warthin's tumor	20 (35.1%)
Pleomorphic adenoma	12 (21.0%)
Myoepithelioma	1 (1.8%)
Malignant	17 (29.8%)
Squamous cell carcinoma	8 (14%)
Ex-adenoma carcinoma	2 (3.5%)
Salivary duct carcinoma	2 (3.5%)
Malt lymphoma	1 (1.8%)
Acinar cells adenocarcinoma	1 (1.8%)
Sarcomatoid carcinoma	1 (1.8%)
Mucoepidermoid carcinoma	1 (1.8%)
Basal cell carcinoma	1 (1.8%)
Size (cm±SD*)	(1.85±5.92)

* Benign lymphoepithelial proliferation, sialadenitis and brachial cyst; ** SD, standard deviation.

Table 4. Complications in the postoperative period.

Characteristics	Number of patients (n=57)
Clinical complications	7 (12.3%)
Neurological	2 (3.5%)
Respiratory	3 (5.3%)
Decompensated diabetes	1 (1.8%)
Arterial pressure instability	4 (7.0%)
Need of transfusion	1 (1.8%)
Surgical complications	13 (22.1%)
Bleeding/bruising	6 (10.5%)
Seroma	3 (5.3%)
Salivary fistula	1 (1.8%)
Infection	6 (10.5%)
Dehiscence	3 (5.3%)
Facial nerve dysfunction (Brackman-House)	24 (42.1%)
II	3 (5.3%)
III	11 (19.3%)
IV	6 (10.5%)
V	2 (3.5%)
VI	2 (3.5%)
Reoperation due to hematoma	4 (7%)
Length of stay (days±SD)	(4.04±3.92)

SD: standard deviation.

Among the analyzed variables, only total parotidectomy [one case (3.3%) in eight (29.6%), $p=0.02$] and lymphadenectomy [two cases (6.7%) in nine (33,3%), $p=0.01$] showed association with facial nerve dysfunction. Patients with malignant tumors had more advanced age than patients with benign tumors (70.24 ± 6.47 vs 66.38 ± 6.34 , $p=0.02$), as well as longer surgical times (260.29 ± 88.73 vs 201.93 ± 84.25 , $p<0.01$), higher intraoperative complications rates (eight, 47.1% vs three, 7.5%, $p<0.01$) and longer hospital admission (6.47 ± 6.17 vs 3 ± 1.66 , $p<0.01$).

As for clinical complications in the postoperative period, longer surgical time was associated with higher incidence of complications (203.24 ± 55.58 vs 334.29 ± 176.36 , $p=0.02$), as well as lymphadenectomy (14% vs. 57.1%, $p=0.006$) (Table 5). The main variables that showed an association with surgical wound complications were size of the nodule detected by the imaging exam (3.83 ± 1.01 vs 2.53 ± 0.92 , $p=0.007$), size of the surgical specimen (6.87 ± 2.04 vs 5.64 ± 1.72 , $p=0.03$), longer surgical time (255.38 ± 93.89 vs 208.68 ± 85.69 , $p=0.04$), reoperation ($p=0.0001$), volume of crystalloid solutions administered intraoperatively (3538.46 ± 3590.85 vs 1772.73 ± 544.04 , $p=0.01$) and length of hospital stay (7.77 ± 6.69 vs 2.93 ± 1.44 , $p=0.008$) (Table 5).

DISCUSSION

Neoplasms of the parotid glands affect 1:100,000 inhabitants, representing 0.6% of all neoplasms^{1,3,5,6}. Among the benign ones, the pleomorphic adenoma is the most common type, followed by the Warthin's tumor^{1,3,7,8}. Malignant tumors are a minority, occurring in 15% to 30% of cases, and among these, the most common

primary neoplasias are mucoepidermoid carcinomas followed by adenoidecystic carcinomas^{3,7,8}. However, the incidence of parotid tumors is influenced by geography, gender and age^{3,7}. The frequency of malignant tumors of the parotid glands also varies possibly due to the lower incidence. In Brazil, a review of 154 cases showed a predominance of pleomorphic adenoma, followed by Warthin's tumor between benign neoplasms and mucoepidermoid carcinoma followed by squamous cell carcinoma among malignancies⁶.

In our study, there was a predominance of benign tumors, the most frequent being Warthin's tumor, followed by pleomorphic adenoma and myoepithelioma. This result corroborates with studies in the elderly populations^{3,9}, in which the most common benign tumor was the Warthin's tumor and not the pleomorphic adenoma that leads the rates in the general population. Among malignant tumors, squamous cell carcinoma was the most frequent, contrasting with the worldwide incidence of malignant tumors of the parotid, so that only one patient had mucoepidermoid carcinoma and there were no cases of adenoidecystic carcinoma. Other studies have shown a predominance of squamous cell carcinoma as the main malignant neoplasm in this age group^{1,8}. Our study also showed that in the elderly, the male gender is more susceptible to parotid neoplasias, in the proportion of 2:1, which has already been observed by other authors^{1,7,8,10}.

FNA is an important diagnostic tool for lesions of the parotid gland, with the main objective of establishing the differential diagnosis between benign and malignant lesions^{3,11}. Values of sensitivity and specificity vary greatly between studies. Values of 62% to 79% sensitivity and 98

Table 5. Association between preoperative and perioperative variables with clinical complications.

Characteristics	Clinical Complications		p	Surgical Complications		p
	Absent (n=50)	This (n=7)		Absent (n=44)	This (n=13)	
Female	16 (32%)	3 (42.9%)	0.5682	16 (36.4%)	3 (23.1%)	0.3719
Age (years±SD*)	(67.08±6.06)	(70.71±9.43)	^a 0.3736	(67.36±6.09)	(68.08±8.23)	^a 0.8862
Smoking	30 (60%)	4 (57.1%)	0.8853	24 (54.5%)	10 (76.9%)	0.1485
Diabetes	8 (16%)	2 (28.6%)	0.4128	6 (13.6%)	4 (30.8%)	0.1536
Hypertension	24 (48%)	3 (42.9%)	0.7985	21 (47.7%)	6 (46.2%)	0.9205
ASA**						
1	3 (6%)	0 (0%)	0.2183	3 (6.8%)	0 (0%)	0.5638
2	43 (86%)	5 (71.4%)		36 (81.8%)	12 (92.3%)	
3	4 (8%)	2 (28.6%)		5 (11.4%)	1 (7.7%)	
Volume (ml±SD*)	(1940±1368.9)	(3857.14±3749.6)	0.0736 ^a	(1772.73±544.04)	(3538.46±3590.85)	0.0131 ^a
Surgical time (min±SD*)	(203.24±55.58)	(334.29±176.36)	0.0264 ^a	(208.68±85.69)	(255.38±93.89)	0.0430 ^a
Parotidectomy						
Partial	9 (18%)	1 (14.3%)	0.1092	10 (22.7%)	0 (0%)	0.1518
Superficial	35 (70%)	3 (42.9%)		27 (61.4%)	11 (84.6%)	
Total	6 (12%)	3 (42.9%)		7 (15.9%)	2 (15.4%)	
Lymphadenectomy	7 (14%)	4 (57.1%)	0.0067	7 (15.9%)	4 (30.8%)	0.2329
Perioperative Complications	8 (16%)	3 (42.9%)	0.0917	8 (18.2%)	3 (23.1%)	0.6944
Neoplasm						
Benign	37 (74%)	3 (42.9%)	0.0916	33	7 (53.8%)	0.1635
Malignant	13 (26%)	4 (57.1%)		11 (25%)	6 (46.2%)	
Size (cm±SD*)	(5.99±1.71)	(5.41±2.79)	0.2279 ^a	(5.64±1.72)	(6.87±2.04)	0.0338 ^a

* DP, standard deviation; ** ASA, American Society of Anesthesiologists; ^a a Chi-square test of independence and Mann-Whitney Test.

to 100% specificity for diagnosis of malignant tumors were reported in studies with 153 and 320 patients, respectively^{5,12}. In our study, 24.6% of FNA were indeterminate and one possible explanation is the delay in analyzing the slide by the pathologist. Deneuve *et al.* observed no cases of inconclusive cytological analysis when the specimen was analyzed by the pathologist immediately after collection and the puncture repeated in case of unsatisfactory material¹³. Diagnostic tests for malignant tumor detection in our study were similar to other studies, with a low sensitivity (50%) and specificity of 100%. The low sensitivity may be a reflection of the sample size³. There were three cases of false negative for malignancy, in which cytology showed two cases of "epithelial proliferation" and one "suggestive of pleomorphic adenoma", whose histopathological reports were, in two cases, metastatic squamous cell carcinoma and one of ex-pleomorphic adenoma salivary duct carcinoma. These results may have occurred due to sampling errors, lack of adequate material or difficulty distinguishing reactive cells from malignant ones³. Thus, our findings show that cytological results compatible with benign lesions should not be used to guide an expectant management in tumors of the parotid glands¹³.

There is strong evidence that 60% of parotid tumors are in close contact with the facial nerve and that the risk of nerve damage is proportional to the extent of neural dissection¹¹. Thus, the main postoperative complication in parotid lesions is facial nerve dysfunction³. The incidence of neural dysfunction in our work reached 42.1%, with a predominance of grade III in 19.3% of cases, similar to that described in the literature, in which rates range from 15% to 40%. Although our work evaluates the

dysfunction only in the period of hospitalization after surgery, the literature shows that the vast majority of dysfunctions are transitory in the dissections of benign tumors and the risk of permanent injury occurs in 0% to 4% of the cases^{11,14}.

More conservative surgical techniques, which do not dissect all branches of the facial nerve and resect less parotid tissue, such as partial superficial parotidectomy, have become more popular^{11,15}. In this context, studies showed a reduction in surgical time, lower rates of facial nerve dysfunction and better aesthetic results with partial parotidectomy in relation to superficial parotidectomy^{11,15}. Our study demonstrated a tendency (without significance) to increase in cases of nerve dysfunction with superficial parotidectomy and a strong association of this complication with total parotidectomy. In a review of 131 patients, total parotidectomy was associated with a high incidence of neural dysfunction, with a 61% incidence in the postoperative period¹⁶. A higher incidence of facial nerve palsy is expected in radical surgical approaches, such as total parotidectomy³.

Among the procedures combined with parotidectomy, only lymphadenectomy showed association with facial nerve dysfunction. The literature shows that 14% to 24% of patients with parotid gland carcinoma will require cervical dissection due to clinical evidence of metastasis at disease presentation¹⁷. Thus, almost half of the patients submitted to lymphadenectomy presented infiltration of the facial nerve, most of whom had a diagnosis of invasive or metastatic squamous cell carcinoma (SCC). Thus, the risk and nature of the complications after parotidectomy depend on the extent of surgery, tumor pathology and tumor location within the gland^{17,18}.

In a multicentric study of 2,919 patients with no population selection, mean age 59 years, 5.3% of patients undergoing parotidectomy experienced some type of complication. In this study, the mean length of hospitalization was 1.6 days, the clinical complications rate was 3.1%, the surgical complications rate was 2.6%, and reoperation was required in 2.6% of cases¹⁹. In our study, in a population with a mean age of 67 years, the incidence of clinical and surgical complications and re-interventions was 12.3%, 22.1% and 7%, respectively, and the mean length of hospitalization was four days. Malignant neoplasms are associated with more extensive procedures and longer hospital stay (6.47 ± 6.17 vs 3 ± 1.66 , $p < 0.01$). Another factor observed in our study were the surgical wound complications, which showed a high association with the increase in hospital admission.

In our study, postoperative clinical complications were associated with surgical time and neck dissection. The mean surgical time in our work was 219.33 ± 88.99 (ranging from 105 to 630 minutes), and longer surgical time presented statistical association with the incidence of clinical complications. The mean surgical time for patients who developed complications was 334.29 ± 176.36 ($p = 0.02$), showing a direct association and being considered a predictor factor.

In the intraoperative period, the volume of infused crystalloid and the surgical time showed an association with surgical wound complications. The volume infused causes tissue edema, leading to increased drainage through the wound in addition to hemodiluting factors of the coagulation cascade and healing. Edema,

increased drainage and delay in wound drying are risk factors for infection²⁰⁻²². It is consensual that the time of surgery predisposes to clinical and surgical complications, especially the increase in the incidence of infection. Shkedy *et al.*²² found an association between a period longer than 120 minutes and operative wound infection. Infection is the most frequent complication in the literature, with incidence reaching 29.9% for salivary gland surgery^{19,23,24}. Nouraei *et al.* demonstrated an incidence of 7% and identified age above 60 years as a risk factor for surgical wound infection²⁵. Edema and hematoma were reported as factors related to wound infection²².

Bleeding and hematoma after parotidectomy are uncommon and are usually related to inadequate hemostasis at the time of the surgical procedure. Treatment consists of evacuation of the hematoma and control of bleeding sites²⁶. In an extensive review of 3,200 cases of head and neck surgery, parotidectomy was the procedure with the highest incidence of wound bleeding, 1.7%²⁷. The incidence in our work was 10.5%, and four patients required a surgical reassessment to review hemostasis.

Despite the limitations of the study, related to the small sample and retrospective analysis, we conclude that the incidence of malignant tumors increases with age and are more common in the male gender. The benign and malignant histological subtypes present a differentiated profile in the elderly population in comparison with the general population, especially Warthin's tumor and SCC. The greater the age and the more aggressive the neoplasia, the greater the clinical and surgical complications, and the longer the hospital stay.

R E S U M O

Objetivo: avaliar subtipos histológicos mais incidentes e as principais complicações pós-operatórias em pacientes idosos portadores de tumor de parótida e submetidos à parotidectomia. **Métodos:** estudo retrospectivo de 57 pacientes idosos submetidos à parotidectomia, no período de 2003 a 2017, no Hospital Municipal São José de Joinville, Santa Catarina, Brasil. **Resultados:** trinta e três (57,9%) pacientes tinham tumores benignos, sendo o mais frequente o tumor de Warthin, e 17(29,8%) tumores malignos, sendo o carcinoma escamoso o mais frequente. Sete (12,3%) pacientes evoluíram com complicações clínicas, sendo a labilidade pressórica e as complicações respiratórias as mais incidentes em quatro (7%) e três (5,3%) casos, respectivamente. Treze (22,1%) pacientes apresentaram complicações cirúrgicas relacionadas à ferida operatória, sendo o hematoma e a infecção de ferida as mais incidentes, com seis (10,5%) casos cada. Vinte e quatro (42,1%) pacientes tiveram algum grau de disfunção do nervo facial no pós-operatório, sendo o grau III de Brackman-House, em 11 casos (19,3%), o mais frequente. O tempo cirúrgico e a linfadenectomia mostraram associação com complicações clínicas. As principais variáveis que apresentaram associação com complicações cirúrgicas foram: tamanho do tumor, tempo cirúrgico mais longo, reoperação e volume de infusão de cristaloides no transoperatório. **Conclusão:** as neoplasias parotídeas apresentam perfil diferenciado na população idosa, destacando-se o tumor de Warthin e o carcinoma escamoso. Hematoma e infecção da ferida operatória, e as lesões do nervo facial foram as complicações mais prevalentes no pós-operatório.

Descritores: Glândula Parótida. Neoplasias. Neoplasias Parotídeas. Idoso. Período Pós-Operatório.

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Received in: 04/16/2018

Accepted for publication: 07/03/2018

Conflict of interest: none.

Source of funding: none.

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