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Determining the Incidence of Complications Following Parotidectomy Surgery Based on Type of Drain

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Abstract

Background: Parotidectomy surgery has different complications including facial nerve paralysis, hematoma, seroma, surgical site infection and flap necrosis. The temporary paresis of the facial nerve can occur due to stretching of the facial nerve or its branches in drain usage.

Aim: to investigate incidence of postsurgical complications in parotidectomy using of hemovac and penrose drain.

Methods: This longitudinal follow up study was performed in the patients with parotidectomy. The patients with temporary paresis of facial nerve in the recovery room, 24-48 hours, and one week after the surgery were determined. The data (characteristic variables and complications of parotidectomy) were introduced into SPSS 18 and analyzed. The significance level of statistical tests was considered less than 0.05.

Results: The mean age of patients was 44.40±15.28 years, and the total incidence of temporary paresis of facial nerve was 16.7%. The frequency percentage of temporary facial nerve paresis at three times of measurement was higher in the group with hemovac drain than group with penrose drain, though these differences were not statistically significant (p-value>0.05). The frequency percentage of hematoma was the same in both groups. Further, the incidence of temporary paresis of facial nerve was higher in complete parotidectomy than superficial parotidectomy, which was not statistically significant (p=0.085).

Conclusion: The findings of this study suggest that the temporary paresis of facial nerve may be less in using of penrose drain following parotidectomy. Since the penrose drain is less expensive compared to hemovac drain, thus it seems that penrose drain could be preferred on hemovac drain. In order to achieve more robust evidence in this regard, more studies with larger sample size and longer follow-up period are proposed for the future.

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Introduction

The salivary gland tumors usually have a low prevalence and account for only 3 to 4 percent of all head and neck neoplasms. More than half of the salivary gland tumors are benign, with 70 to 85 percent of tumors developing in the parotid gland (1). Pleomorphic adenoma accounts for 84% of benign tumors and 45% of all neoplasms of salivary glands. The maximum prevalence of these tumors is observed in the fifth decade of life, which is observed more in women. The complications of parotid surgery may develop either during surgery or post operation (2). The complications include facial nerve paresis, Frey's syndrome, fistula and sialocele, flap necrosis, and hematoma. One of the most important complications is risk of facial nerve damage. Facial nerve damage can cause aesthetic problems and functional impairment

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for the patient (3). The prevalence of facial nerve paresis following parotidectomy is 20 to 40 percent, while permanent paresis occurs in less than 4% of patients. The degree of weakness or paresis of this nerve ranges from minor weakness of one or some branches of facial nerve up to complete paresis (4, 5).

In study's Terrell reported abnormal functioning of facial nerve without using monitor as high as around 62% (4). Various factors affect facial nerve damage during surgery that consisted of tumor size, histopathologic type of tumor, site of the tumor, the extent of surgery, reoperation, and the surgeon's skills (3, 6).

One of probable agents effective on complications, is using of drains. Drains are used for discharge of blood, secretions, and air from the surgical site to prevent the necrosis of the wound edges, wound contamination and pain. They are usually categorized into two major groups: passive drains and active drains. Passive drains include penrose, corrugated and T-tube which are used in the abdominal area surgery On the other hand, active drains include hemovac drain for orthopedic, neurological, mastectomy surgical operations. Drains are usually devised at the site of surgery through a hole in the skin close to the incision line, and are fixed through sterilized non-absorbable threads of suture or clips (passive drains), or they are connected to a container device in order to create negative pressure (active drains).

Based on our literature review, no comprehensive study has been performed about the complications of different types of drain in parotidectomy surgery. There are some studies about the complications of using drain in general surgeries such as thyroidectomy, cholecystectomy, and surgery of inguinal hernia. All of those have concluded that use of drain causes prolonged hospitalization, increase pain as well as scar, and generally have no advantage (8-10).

The aim of this study is to investigatethe complications following parotidectomy surgery using each type of drain (passive drain and active drain) in Loghman Hakim hospital.

Methods

In this study, the patients who were candidate for the parotidectomy surgery were included from 20 June 2017 to 20 March 2019. All patients perceived the routine examinations of the ENT ward of Loghman Hakim hospital, and underwent parotidectomy surgery. The written informed consent form was taken from them. The sample size was determined at least 41 patients based on facial nerve weakness in study's Terrell (5), a 95% confidence interval and a precision 0.15. The selection of patients was using convenience sampling. Postsurgical complications (facial nerve paresis, hematoma/seroma, surgical site infection, and flap necrosis) were investigated at three times: in the recovery room, 24-48 hours after surgery, and one week postoperation.

The data was collected in a special form and entered into SPSS 18 (SPSS Inc., Chicago, IL). The descriptive report of the quantitative variables, mean±standard deviation, was employed, while for the qualitative variables, number and frequency percentage were used. For analytical statistics, independent t-test (in case of data normality in the two groups) was employed; otherwise, Mann-Whitney U test was used. Chi-square test was applied to investigate relationship between the complications and the type of drain. All analyses were based on a significance level of less than 0.05.

Results

This study was investigated the incidence of complications following parotidectomy in 42 patients. The mean age of them was 44.40±15.28 years, ranging from 12 to

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77 years old. Overall, 19 men (45.2%) and 23 women (54.8%) were investigated. Sixteen patients (38.1%) were underwent complete parotidectomy surgery, while 26 (61.9%) received superficial parotidectomy surgery. There were 33 (78.6%) and 9 (21.4%) of patients with benign and malignant tumors, respectively. The morphological patterns of tumor included pleomorphic adenoma (n=22, 52.4%), warthin's tumor with (n=6, 14.3%), adenoid cystic carcinoma (n=6, 14.3%), lipoma (n=3, 7.1%), Ox-polymorphic(n=2, 4.8%), and hemangioma, myoepithelial carcinoma, and epidermoid cysts each with one case (Figure-1).

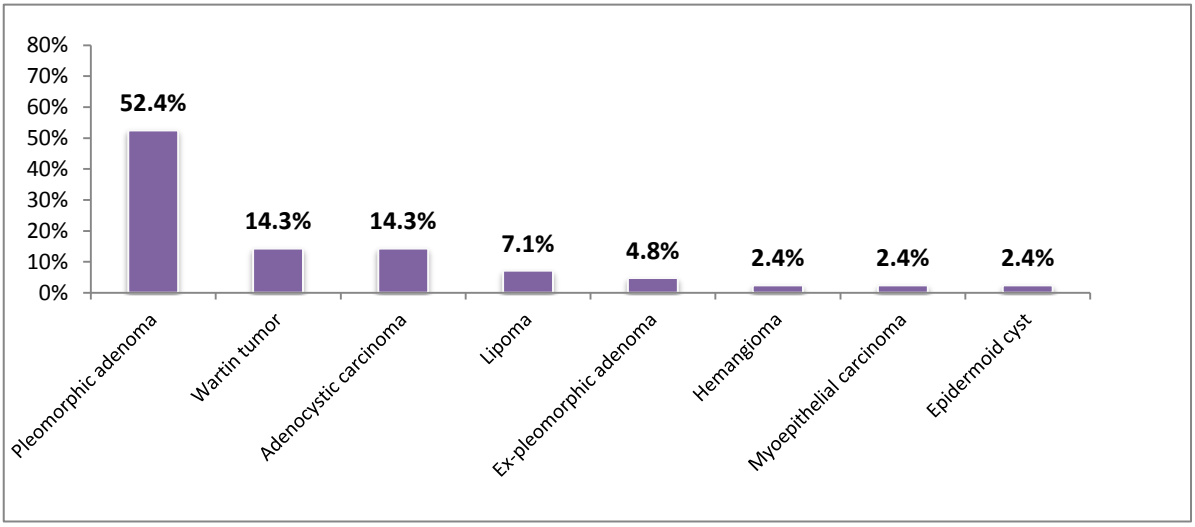

Figure 1. The types of parotid gland tumors.

Generally, there were nine patients with complication in in follow -up period. The temporary facial nerve paresis was 16.7% (7 out of 42 patients) and hematoma/seroma was observed in two patients. No cases of infection and flap necrosis were observed in any of the patients throughout the study period. The incidence of temporary facial paresis in complete and superficial parotidectomy operations was 31.2% (5 from 16) and 7.7% (2 from 26), respectively, which has not been statistically significant (p=0.085). In terms of tumor type, it was 33.3% (3 out of 9) in malignant tumors and 12.1% (4 out of 33) in benign tumors (p=0.155).

Incidence of temporary facial nerve paresis was investigated in three times: immediately in the recovery room (n=5, 11.9%), 24-48 hours following surgery (n=4, 9.5%), and one week after the surgery (n=1, 2.4%).

The complication rate was compared based on type of drain. One group had hemovac drain (H-group) and other group had penros drain (P-group). There were not statistically significant difference between two groups in terms of age, gender, type of parotid salivary gland tumor (malignant/benign) and the type of surgery (Table 1). We found temporary paresis of facial nerve in 7 patients that were 5 patients (23.8%) in H-group and 2 patients (9.5%)in P-group (p=0.410). There were no significant association between type of drain and the complications. The proportion of temporary facial nerve paresis in H-group was more than P-group in follow-up times (Figure-2).

The rate of hematoma in complete and superficial surgery was 6.2% (1 out of 16 cases) and 3.8% (1 out of 26 cases), respectively.

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Table 1: Demographic and complication characteristics in total patients and groups with hemovac and penrose drain.

Groups / Variables	Total (n=42)	H-group (n=21)	P-group (n=21)	p-value
Gender				
Female	23(54.8)	9(42.9)	14(66.7)	0.215
Male	19(45.2)	12(57.1)	7(33.3)	
Age	44.40±15.28	47.14±15.74	41.67±14.67	0.237
Type of tumor				
Benign	33(78.6)	15(71.4)	18(85.7)	0.454
Malignant	9(21.4)	6(28.6)	3(14.3)	
Type of surgery				
Superficial parotidectomy	26(61.9)	10(47.6)	16(76.2)	0.111
Complete parotidectomy	16(38.1)	11(52.4)	5(23.8)	
Hematoma/Seroma	2(4.8)	1(4.8)	1(4.8)	1.000
Facial nerve paresis in the recovery room	5(11.9)	4(19.0)	1(4.8)	0.343
Facial nerve paresis 24-48 hours after surgery	4(9.5)	3(14.3)	1(4.8)	0.606
Facial nerve paresis one week after surgery	1(2.4)	1(4.8)	0(0.0)	1.000
Surgical site infection	0(0.0)	0(0.0)	0(0.0)	NA
Flap necrosis	0(0.0)	0(0.0)	0(0.0)	NA

Data presented number (%) and analyzed using chi-square test, age reported mean±standard deviation and tested by Mann-Whitney. U test (due to abnormal distribution). The significant level was considered less than 0.05.
H-group:Hemovac drain group, P-group: Penrose drain group.
NA: Not-applicable.

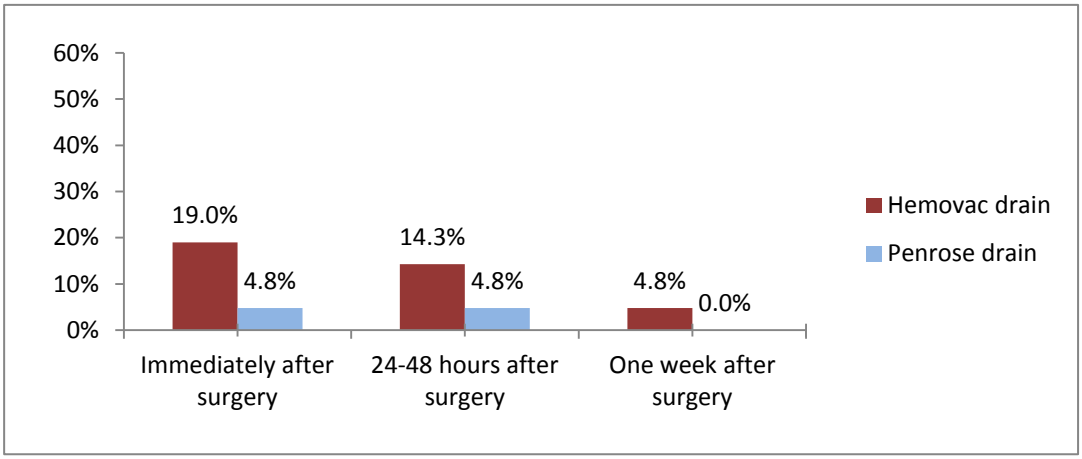

Figure 2: The frequency percentage of facial nerve paresis based on the drain type (Hemovac and Penrose) in the three times.

Two patients with hematoma/seroma had benign tumor and were male. From seven patients with temporary facial paresis, 4 patients were female and the rest were male.

In the H-group with facial nerve paresis (n=5), most of these patients were male(n=3, 60.0%), 3 patients had malignant tumor and 4 patients underwent complete parotidectomy . Five patients with this paresis in the recovery room, that one of them had this problem one week after surgery. The frequency distribution of this complication according to the variables of this study is presented in Table 2.

The patients with temporary paresis of facial nerve at 24-48 hours had complete parotidectomy. None of them had this paresis in the examination one week after surgery.

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Table 2: frequency distribution of facial nerve paresis in all patients and two groups.

Groups / Variable	Temporary facial nerve paresis					
	In the recovery room			After 24-48 hours surgery		
	Total(n=5)	H-group	P-group	Total(n=4)	H-group	P-group
Gender						
Female	2(40.0)	1(25.0)	1(100.0)	3(75.0)	2(66.7)	1(100.0)
Male	3(60.0)	3(75.0)	0(0.0)	1(25.0)	1(33.3)	0(0.0)
Age(mean±SD)	46.90±18.51	51.00±13.56	25	32.75±19.60	37.33±21.22	19
Type of tumor						
Benign	3(60.0)	2(50.0)	1(100.0)	3(75.0)	0(0.0)	1(100.0)
Malignant	2(40.0)	2(50.0)	0(0.0)	1(25.0)	3(100.0)	0(0.0)
Type of parotidectomy						
Superficial	2(40.0)	1(25.0)	1(100.0)	0(0.0)	0(0.0)	0(0.0)
Complete	3(60.0)	3(75.0)	0(0.0)	4(100.0)	3(100.0)	1(100.0)

Data presented number(%) and only age reported mean±standard deviation
H-group:Hemovac drain group, P-group: Penrose drain group

One patient had this paresis one week after surgery who was a male with a benign tumor and complete parotidectomy and was applied hemovac drain.

Discussion

The majority of these patients were middle-aged and female who had benign tumors according to the pathology. The most common benign tumor of these patients was pleomorphic adenoma, which has been similar to many studies in this regard (8, 9). The most common malignant tumor in our findings was adenoid cystic carcinoma which has also been reported in the study by Ansari of squamous cell cancer (8) and by Maahs as epidermoid carcinoma (5).

Parotidectomy can lead to various complications in patients including incidence of temporary or permanent paresis of facial nerve, surgical site infection, hematoma, and flap necrosis. Some complications such as hematoma and bleeding are uncommon(11). Facial nerve paresis is the most important complication which incidence and other complications depend on the size and the extent of tumor, degree of inflammation, skill of the surgeon, and surgical technique. The incidence of this paresis is higher in complete parotidectomy and malignant parotid tumors compared to superficial parotidectomy and benign tumors (7, 10). The incidence of this complication varies between 20 and 40% according to different studies (5, 12, 13). This may remain permanent in some cases and lead to negative effects on the quality of life of patients.

The risk of permanence of facial nerve damage following parotid tumors surgery has been reported to be 0 to 4 percent, which depends on immediate monitoring of the facial nerve function impairment following parotidectomy, early diagnosis and treatment, surgeon's skill, and surgery technique (7, 9). Generally, we detected 11 cases temporary paresis of facial nerve in follow up period (26.2%), which has been higher in comparison to other studies(5, 14). The study by Maahs and colleagues was a retrospective study examining 154 patients, most of whom had undergone superficial parotidectomy surgery while preserving facial nerve and the incidence of this complication was reported 15% (5).

In another study, 17.4% of patients experienced temporary paresis of facial nerve (6.4% and 11.1% in superficial and complete surgery respectively), which have been lower than our finding. This difference can be attributed to the type of surgical technique

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(use of microsurgery) in that study (14). Gaillard et al. and, Fareed colleagues reported the incidence of temporary paresis higher than our figures (9, 15).

Of the temporary paresis of facial nerve was not statistically different between two groups with hemovac and penrose drains. Because of being thick and having suction and stretching properties, Hemovac drain can potentially damage facial nerve or its branches. However, Penrose drain does not have these effects and risks. Therefore, it is justified that the rate of facial nerve paresis be greater in Hemovac drain usage more than Penrose. However, the percentage of paresis in each three follow-up times was in the group with hemovac drain higher than penrose drain. In our literature review, no similar study was found for determining the effectiveness of the type of drain in parotid surgery. The frequency of hematoma, were the same both groups. There was no case of infection and flap necrosis in our patients while using penrose drain can be risk factor for these problems.

These two study groups did not differ significantly in terms of possible variables affecting the postoperative complications. Our findings suggest that the less incidence of temporary paresis of facial nerve in the group with penrose drain and absence of more complications in them, this drain might be a suitable choice. However, given the limited sample size in this study, other studies with a larger sample size (estimated from the results of this study) and clinical trial studies should be designed to achieve more robust evidence.

Conclusion

According to more cases of facial nerve damage in hemovac drain and also the high cost of using this type of drain compared to penrose drain, it seems that use of penrose drain in parotidectomy surgery could be preferred over hemovac drain.

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Conflicts of Interest

The authors declare no conflicts of interest.

Ethics

This study was approved by the "Ethics Committee of Shahid Beheshti University of Medical Sciences (Tehran, Iran)"; Registration Code: IR.SBMU.MSP.REC.1398.072

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