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Evaluation of Efficacy of Drained and Drainless Parotid Surgery

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***Abstract*— *Background**: The primary therapy for parotid tumors is surgery. Effective drained procedures reduce fluid buildup and improve fluid monitoring. However, drainless surgeries are becoming increasingly prevalent, which may reduce hospital stays and increase patient comfort. However, drainless methods may cause fluid collection.* ***Aim of the study**: To evaluate parotidectomy outcomes and complications with and without drains.* ***Patients and methods**: A case-control study investigated 30 superficial parotidectomy patients at Gazi Al-Hareri Teaching Hospital from January 2022 to December 2023. Participants who have had radiation exposure, certain medical problems, or prior surgeries are not eligible for a superficial parotidectomy. Demographics, medical history, and clinical assessment were collected before, during, and after operation. We will record the surgical approach, drain usage, operation length, and problems (hospital stay, complications, pain scores, facial nerve function, and patient satisfaction).* ***Results**: fifty percent of study subjects had drained parotidectomy, 50% did not. Males dominated both groups (73.8 percent drained, 80 percent drainless). Average age was 48 years, and age distributions were statistically comparable. The average tumor size did not vary significantly between the two groups. Drained surgeries averaged 129.2 minutes, whereas drainless ones averaged 113.6. Blood-drained patients were far more painful. Postoperative complications included infection, hematoma, and seroma. However, the total complication incidence was 30% across all groups.* ***Conclusion**: Drainless parotidectomy was not associated with higher rate of seroma formation or facial nerve palsy. Drained parotidectomy is associated with higher post operative pain score.*

Keywords— *Parotidectomy, drain, seroma, facial nerve, hospital stay, pain score.*

I. INTRODUCTION

The main course of treatment for a parotid tumour is surgery (parotidectomy). The extent of the procedure depends on the histological subtype, the position and size of the tumour, as well as the surgeon's background and training (1). Traditionally, post-operative care has seen the insertion of a vacuum drain to help evacuate the dead space left post excision of the tumour and surrounding parotid tissue (2). This often mandates an overnight hospital stay. Standard procedure dictates the removal of the drain when its accumulated fluid volume drops below a set threshold over a 24-hour period (3). Multiple variables like the patient's age, accompanying health conditions, and the distance between the hospital and the patient's residence play a significant role in the choice between inpatient and outpatient surgical procedures (2).

Consequently, patients typically find themselves hospitalized for a duration spanning 1.8 to 2.5 days (2). The idea of outpatient parotidectomy involved discharging patients with an intact drain, which was subsequently removed three days post-surgery (4). This strategy was found to be not only practical but also safe by both patients and their caregivers. Parotidectomy's low post-operative complication rate makes it an apt candidate for day-case surgeries (4).

Yet, despite the traditional approach of utilizing a suction drain post parotidectomy, its ubiquitous necessity has been under scrutiny. Potentially, post-drainless parotidectomy could enable patients to be discharged the same day, circumventing the logistical challenge of a follow-up drain removal appointment (4).

Aim of the study:

• To compare drained and drainless parotid surgery outcomes and hospital stays.

II. PATIENTS & METHODS

A prospective case control study conducted in the maxillofacial department at Gazi Al-Hareri Teaching Hospital from January 2022 till the end of 2023. It was involved 30 cases of patients (11 males and 12 females) candidates for parotid surgery (superficial parotidectomy).

Inclusion Criteria: Patients' candidate for superficial parotidectomy for parotid mass. Exclusion Criteria: previous parotid surgery, chronic inflammatory conditions, patients require total parotidectomy, patients with chronic medical conditions, history of irradiation to face or neck.

Preoperative Data Collection

- Patient Demographics: Using standardized forms, age, sex, occupation, and other important demographic data were gathered.
- Medical History: Patient interviews and medical data were used to gather comprehensive medical histories, including comorbidities, allergies, and prior operations.

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Clinical Assessment: clinical examination was done to determine the type of parotid tumor, the surgical strategy, and any further relevant clinical data were noted. The size of the tumor was calculated by ultrasound and CT scan with IV contrast preoperatively, the ideal measurement is by MRI scan which was not available for all patients, thus substituted by CT with IV contrast.

Intraoperative assessment: Surgical Technique: The specific surgical procedure, including the incision type, method of dissection, and any intraoperative decision-making, was documented.

- Use of Drain: For the drain group, the closed-suction drain's type, size, and method of placement were noted.
- Duration of Surgery: Minutes were counted from the start of the incision to its completion.
- Intraoperative Complications: Any issues or difficulties encountered during the procedure were thoroughly documented.

• Postoperative Data Collection

- Hospital Stay: The duration of the patient's hospital stay was recorded, including any time spent in the intensive care unit or recovery room.
- Time to Drain Removal: The length of time it took to remove the drain and any issues that came with it were noted for the drain group.
- Complications: Using accepted criteria and grading methods, specific information

on postoperative complications, such as infections, seromas, and hematomas, was gathered.

- Pain Scores: A validated pain scale (visual analogue score: as 1 the lowest pain, and 10 the most severe pain felt ever) was used to evaluate pain at specific postoperative time points.
- Facial Nerve Function: At certain intervals, the facial nerve's performance was evaluated using a defined scoring system.
- Patient Satisfaction: patient satisfaction, taking into account factors including comfort, cosmetic outcomes, and overall experience.

• Outcome Measures

- Primary and Secondary Outcomes: Postoperative complications, pain intensity, and hospital stay duration were the main outcomes, whereas patient satisfaction and cost-effectiveness were the secondary objectives.

• Follow-up

- Follow-up Schedule: To evaluate long-term results and complications, patients were scheduled for follow-up visits at predetermined intervals (e.g., 1 week, 1 month, 3 months).
- Long-term Assessment: During follow-up visits, long-term outcomes including scar appearance, illness recurrence, or any delayed consequences were noted.

Technique

Anaesthesia The endotracheal tube is fixed to the other side while the treatment is carried out under general anaesthesia. Muscle relaxants should be avoided by the anaesthesia team since facial nerve function needs to be observed. The head is tilted away from the operated side, and the neck is somewhat stretched. An antiseptic solution is used to cleanse the face, being careful not to get any on the eye. Carefully arranged drapes leave the neck and hemiface exposed.

Incision

The incision begins in the temporal region and moves posteriorly behind the lobe of the ear before going inferiorly in the pre-auricular crease, reaching the base of the tragus. It then either swings down inferiorly from the mastoid to continue in a neck crease or extends posteriorly into the hairline as in a face lift. A No. 15 blade, a fine needle diathermy or ceramic blade, or both, may be used to make the incision. The skin flap may be elevated in the plane of the preparotid fascia, but if it is elevated superficially to the SMAS, this layer can be mobilized as a distinct exercise and utilized to cover the parotid's raw surface, preventing most of the cosmetic deformity and the incidence of Frey's syndrome (vide infra). By stitching the flap's edges to the nearby head drapes, the flap is kept forward.

Identifying the trunk of the facial nerve It is not recommended to regularly utilize a nerve stimulator since it could be misleading due to tissue conduction or nerve fatigue. By using blunt dissection with scissors, the blood-free plane anterior to the cartilaginous meatus is exposed. This specifies the depth of the dissection and descends to the base of the skull, just superficial to the styloid process and the stylomastoid foramen. The facial nerve trunk is then visible after a gentle opening up in an inferior direction using blunt.

Remove superficial lobe: After finding the facial nerve trunk, the superficial lobe of the parotid may be "exteriorized" by blunt dissection to broaden the facial nerve's branches' plane. This part of the surgery uses fine scissors in the facial nerve branch plane. Always locate the nerve fiber before splitting parotid tissue.

Drain placement: In 15 of 30 instances, a 14F radivac drain (closed system with negative pressure) was inserted subcutaneously.

A separate incision was used to put the drain onto the parotid bed and secure it with silk suture. The drain output was recorded after surgery.

Closure

The blood pressure returns to normal after the parotid lesion removed, with the head tilted back to a horizontal position. Stop any bleeding points.

The facial nerve is examined for integrity prior to closure. Under the flap, a vacuum drain is placed, and the wound is then meticulously stitched up in two layers. Any accumulation of blood or saliva under the flap can be avoided with the use of a firm pressure dressing.

The parotid bed defect is repaired with a superiorly based sternocleidomastoid (SCM) rotating flap during drainless parotidectomy, and gel foam is inserted into the wound bed to add tissue bulk, separate severed parasympathetic nerve fibers from the overlying skin, and increase haemostasis. After the wound has healed, a facelift dressing is applied post-operatively to maintain pressure on the wound bed and prevent the need for a drain.

First group with vacuum drain subcutaneously (figures 1 and 2) and second group without drain (figures 3 and 4).

Post-operative care: Leave the drain in place until the outflow is less than 15 to 50 cc in 24 hours, then remove the pressure dressing if needed. After five days, skin sutures are removed. Assess facial nerve function in the recovery room as soon as

possible. Facial weakness is common following complete parotidectomy. If all branches were identified and retained, this normally improves with time, although recovery might take months (5).

Ethics and official approvals: We collected data with written permission from each patient. Instead of names, just numbers remained. Information is encrypted on a study laptop. The Arabic Board of Health Specialization Council authorized administrative action. Gazi Al-Hareri Teaching Hospital for Surgical Specialties' maxillofacial department is accredited.

Figure 1: Example on Drained parotidectomy (case No. 1) A: Preoperative marking. B: Excision of superficial parotid lobe with identification of facial nerve. C: Closure with placement of drain.

Figure 2: Example on Drained parotidectomy (case No. 2) A: Preoperative marking. B: Excision of superficial parotid lobe with identification of facial nerve. C: Closure with placement of drain.

Statistics: All data was entered into Microsoft Excel 16 and analyzed using IBM-SPSS (USA Chicago) to display counts, percentage, mean, standard deviation (SD), tables, charts, and graphs, standard deviation (SD), and presented in the form of tables, charts, or graphs.

III. Results

The study included 30 cases, 15 cases underwent parotidectomy and drain placed, while the other 15 cases no drain was used.

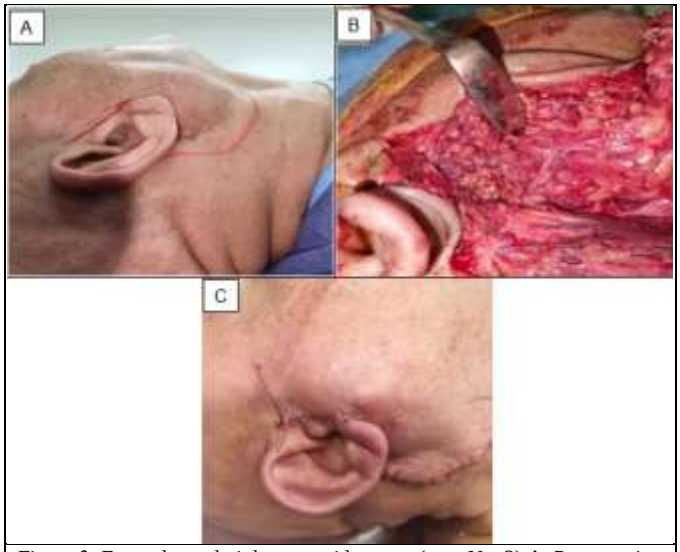

Figure 3: Example on drainless parotidectomy (case No. 3) A: Preoperative marking. B: Excision of superficial parotid lobe with identification of facial nerve. C: Closure with placement of drain.

Figure 4: Example on drainless parotidectomy (case No. 4) A: Preoperative marking. B: Excision of superficial parotid lobe. C: Closure with placement of drain

Gender: The majority of the patients were male 11 cases (73.8% Vs. 80% for drained and drainless groups respectively), while females represent 12 cases (26.7% and 20% for drained and drainless groups respectively). No statistical difference was found according to gender, as shown in Figure 5.

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Patient age and tumor size: The mean age was 48.07 years in the group undergoing parotidectomy with a drain in situ, with a standard deviation of 10.57 years. This indicates a range of ages in the drained group, generally between 37.5 and 58.64 years. The group who received the drainless operation, on the other hand, had a mean age of 47.2 years and a standard deviation that was 7.8 years were more confined. The demographic parameter's estimated p-value of 0.819, which is statistically significant, emphasizes the lack of a significant age difference between the two surgery groups. This suggests that age, a possible confounding factor, is rather constant between the two groups. further details illustrated in Table 1.

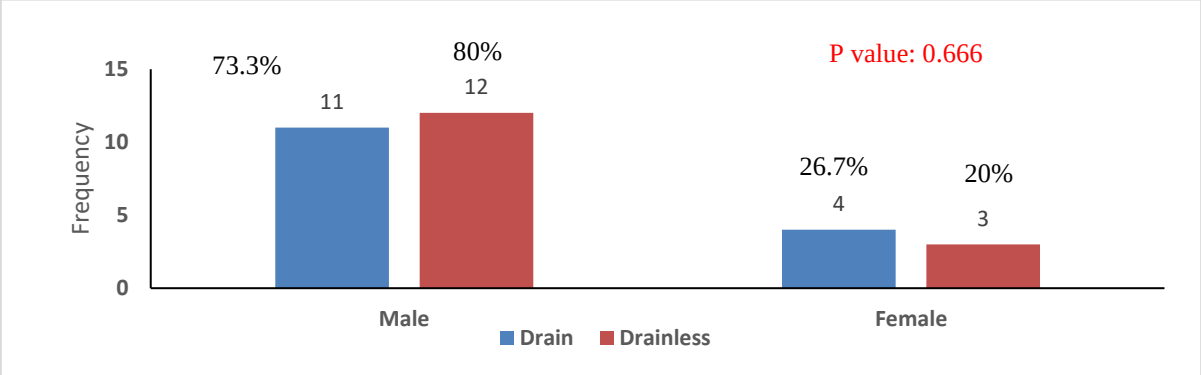

Figure 5: Distribution of cases according to gender.

The mean size of the parotid tumors in the drained group was measured at 56.53 mm, with a standard deviation value of 18.58 mm. This gives a representative range of tumor sizes for this group, with the majority falling between 37.95 mm and 75.11 mm. In contrast, the tumors in the drainless group had a median size of 52.73 mm and an average size variation of 17.77 mm. The estimated p-value of 0.451 suggests that, despite the apparent numerical difference in tumor sizes across the groups, this difference does not exceed the level of statistical significance. Therefore, when evaluating the results of the various surgical methods, the tumor sizes in both cohorts can be viewed as equivalent from a clinical standpoint.

TABLE 1: Distribution of patient age and tumor size according to the groups of the study.

Variables	Drain	Drainless	P value
	Mean ±SD	Mean ±SD	
Age (years)	48.07 ±10.57	47.2 ±7.8	0.819
Size (mm)	56.53 ±18.58	52.73 ±17.77	0.451

Duration of surgery and hospital stay: The average operating time for the group that underwent parotidectomy with an integrated drain was recorded at 129.2 minutes, with a standard deviation of 26.72 minutes. This shows that for this group, the average operation should take between 102.48 and 155.92 minutes. The drainless procedure group, on the other hand, had a shorter mean operative time of 113.6 minutes, with a more confined standard deviation of 13.73 minutes, indicating a primary operative time range between 99.87 and 127.33 minutes. While approaching significance, the computed p-value of 0.106 remained over the usual 0.05 cutoff. This implies that even if the two techniques have apparent differences in operative times, these differences do not reach statistical significance at the conventional 0.05 threshold.

The average length of postoperative hospitalization for the group having surgery with a drain was 25.2 hours, with a standard deviation of 3.36 hours, often reflecting a hospital stay ranging from 21.84 to 28.56 hours. The drainless procedure cohort, in contrast, showed a somewhat shorter mean hospital stay of 24.73 hours, with a standard deviation of 3.24 hours, indicating that the majority of patients stayed between 21.49 and 27.97 hours. Asserting that there is no statistically significant difference in the length of hospitalization between the two surgical methods, the computed p-value of 0.775 for this parameter is noticeably high. This suggests that the post-operative hospitalization times for both surgical techniques are equivalent. Further information shown in Table 2.

TABLE 2: Operative time and hospital stay according to the groups of the study.

Variables	Drain	Drainless	P value
	Mean ±SD	Mean ±SD	
Operative time (minutes)	129.2 ±26.72	113.6 ±13.73	0.106
Duration of hospital stay (hours)	25.2 ±3.36	24.73 ±3.24	0.775

Pain score: The mean value of the postoperative pain scores for patients who underwent parotidectomy with an accompanying drain was 5.6. The standard deviation of this central tendency was 1.18, indicating that the range of pain scores for this group was mostly 4.42 to 6.78. The group choosing the drainless operation, in contrast, reported a mean pain score of 4.4 with a standard deviation of 0.91 and a milder level of pain.

This indicates that the majority of the group's pain scores lie between 3.49 and 5.31. In this comparison, the p-value is calculated to be 0.019. The difference in pain scores between the drain- and drainless-groups is statistically significant. This emphasizes, in clinical terms, the possible impact of drainage on post-operative pain, with the sample that had drainage having noticeably higher pain levels than their drainless counterparts, as shown in Figure 6

Complications: A hematoma occurred in 6.7% (1 out of 15) of the patients who underwent parotidectomy with drainage, but not in the group who underwent the procedure without

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drainage. It was determined that a formal statistical comparison was not applicable because of the low rates in both groups. This case of hematoma was in case with large tumor and treated by cold packs and observation and no need for reoperation.

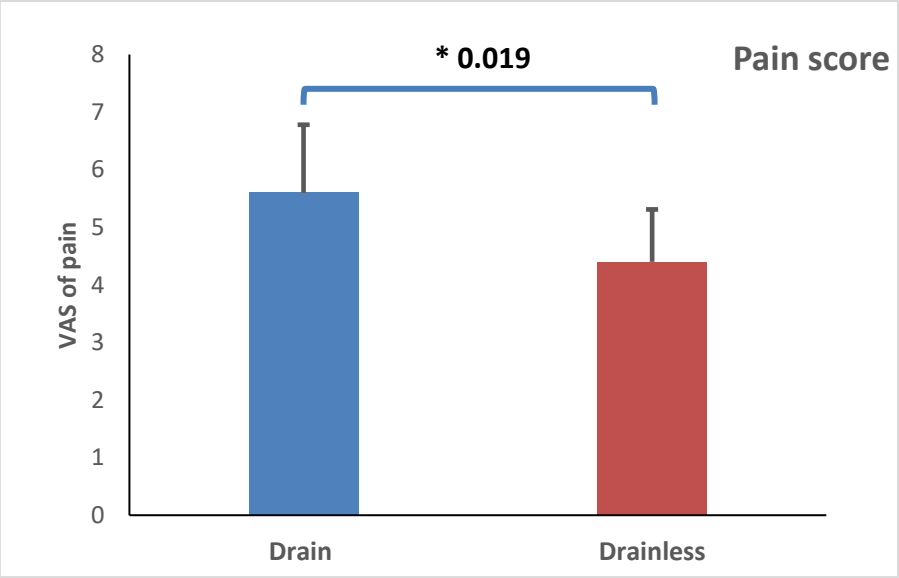

Figure 6: Visual analogue pain score according to the group of the study.

Seroma: Both the groups with and without drains had 13.3% (2 out of 15) of the patients develop seroma after surgery. When the incidence of seroma is statistically equal between the two groups, as indicated by a p-value of 1, both surgical methods are similar in the context of this particular complication.

Infection: One out of every 15 patients in the drain-group showed signs of post-operative infection, compared to zero in the drain-free group. The rarity of this complication, like hematomas, prevented meaningful statistical comparison.

Facial nerve injury: In both surgical groups, 6.7 percent of patients (1 out of 15) exhibited post-operative facial nerve impairment. A p-value of 1 confirms that there is no statistically significant difference in the frequency of this complication between the two methods. Complication due to surgery.

TABLE 3: Distribution of complications according to the group.

Variables		Drain	Drainless	P value
		No. (%)	No. (%)	
Hematoma	Yes	1 (6.7)	0 (0)	N/A
	No	14 (93.3)	15 (100)	
Seroma	Yes	2 (13.3)	2 (13.3)	1
	No	13 (86.7)	13 (86.7)	
Infection	Yes	1 (6.7)	0 (0)	N/A
	No	14 (93.3)	15 (100)	
Facial nerve weakness	Yes	1 (6.7)	1 (6.7)	1
	No	14 (93.3)	14 (93.3)	
Frey's syndrome	Yes	0 (0)	1 (6.7)	N/A
	No	15 (100)	14 (93.3)	

Frey's syndrome: The incidence rate of Frey's syndrome, which only occurred in the drainless group, was 6.7%. (1 out of 15). No cases were reported by the drained group. Due to the rarity of this condition, the data did not allow for a statistical comparison. However, it provides a clinical insight that the drainless group in this study was the only one to experience Frey's syndrome. This case of Frey's syndrome happened in parotidectomy for large tumor, the condition was followed for the first six months with no improvement, the botulinum toxin injection was offered to the patient but he was lost from follow up. It is worth noting that no cases required second admission. Further details shown in Table 3.

Overall Complication Incidence: Five out of 15 patients (33.3 percent) in the group who had parotidectomy with drainage did so with at least one post-operative complication. The drainless group, however, experienced complications at a lower percentage, 26.7 percent (4 out of 15 patients). The p-value for this observed discrepancy between the two groups is 0.690. This p-value shows that the difference in total complication rates between the drained and drainless cohorts is not statistically significant. See table 4.

In contrast, 73.3 percent of patients in the drainless group and 66.7 percent of patients in the drained group recovered from their operations without any noted issues. This further underscores the proximity of complication-free results between the two surgical procedures.

TABLE 4: Overall complication rate.

Overall complication	Drain	Drainless	P value
	No. (%)	No. (%)	
Complication	5 (33.3)	4 (26.7)	0.690
No complications	10 (66.7)	11 (73.3)	

IV. DISCUSSION

The patients typically have a superficial parotidectomy with perioperative drain placement and stay in the hospital until the drain is removed. However, there has been a rising tendency toward outpatient surgical treatments in an effort to slow the healthcare industry's escalating expense, as well as to lessen patient/family stress and nosocomial exposures (6).

Sex distribution was not different between the two groups, also this further used to eliminate the effect of gender on the

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formation of complications, similarly found by Coniglio et al (6). The sex distribution in parotid surgeries might change depending on a number of variables, such as genetic factors, lifestyle differences, or even the particular condition being treated (e.g., benign vs. malignant parotid tumors). There may not be a substantial gender preference for some benign parotid diseases, such as pleomorphic adenomas, but there may be for others. For instance, some studies have revealed that males are more likely than females to develop Warthin's tumor, another benign parotid gland tumor, especially if they have a history of smoking, as suggested by Saravakos et al (7).

A somewhat higher male predominance (73.8 percent and 80 percent) in both groups than in other studies for general parotid surgeries seems reasonable, particularly when considering Warthin's tumor.

Age distribution: Study participants were of similar age. This would further reduce the selection bias, as the rate of seroma formation could be affected by patient age, as inflammatory response would change with aging. Similarly found by Coniglio et al (6).

Tumor size: The size of the tumor was comparable in both groups, also selected to reduce the bias, as large tumors could associate with excessive dissection which increase the risk of both hematoma and seroma, which could affect the outcome of the study. Similarly done by O'Keeffe et al and Cohen et al who in their study use drainless approach but with added tissue sealant and compare it with surgical drain (8, 9).

The length of hospital stays: The length of hospital stay was similar for both groups; cases were discharged after overnight stay or after 24 hours of the surgery. While both O'Keeffe et al (8) and Cohen et al (9) found that drainless surgery associated with decreased hospital stay. The cases in their studies were only after drain removal for drained group. While the current study discharge of the patients was done with giving appointment for the next visit for removal of the drain.

The length of the surgery, the presence of complications, post-operative pain management, the speed of wound healing, and specific hospital or surgeon protocols can all affect how long a patient must stay in the hospital after having a parotidectomy.

The hospital stay described in the current study, which ranged from 24 to 26 hours, is consistent with the typically brief hospital stays for routine parotid procedures in many contemporary healthcare systems, particularly if there were no significant problems. The small difference between the two groups might suggest that the choice to drain doesn't significantly affect how long a patient stays in the hospital.

Although the findings of the existing research have varied, many contemporary studies and protocols point toward shortening hospital stays, independent of drainage, assuming there are no problems.

Pain score (discomfort): The drained group is associated with significantly higher visual analogue pain score when compared to drainless group. This result was not evaluated by previous studies. The possible mechanism of increased pain is due to the discomfort that exerted by drain that could limit patient movement.

Numerous variables, such as the scope and nature of the operation, a person's pain threshold, and the presence or absence of a surgical drain, might affect discomfort after parotidectomy. Additionally subjective and varied from patient to patient, pain perception and tolerance are also extremely common.

Complications: The rate of hematoma formation could not be calculated as it developed in only one case (with drain) the previous studies showed that no increase rate of hematoma formation in drainless surgery as suggested by Flach et al (4) in their systematic review and meta-analysis that included 445 trials, and suggested drainless procedure to be safe and effective option. Sometimes, the presence of a drain, the traction it causes, and any potential tissue irritation might lead to more discomfort or suffering.

Additionally, drain removal, which is frequently performed without aesthetic, can affect how much pain a patient feels generally after surgery. This potential increase in discomfort related to drains has been acknowledged by numerous studies and clinical findings.

The rate of seroma formation was similar in both groups. similarly found by O'Keeffe et al (8) and Cohen et al (9). While Reerds et al (10) found that drainless cases associated with higher rates of seroma formation, but the cases treated conservatively with no further intervention required. Although significant difference was found by Reerds et al (10) the result of their study cannot be generalized as there is difference in sample size for the groups of the study (drained group n=322; drainless group n=29) this discrepancy in sample size exposes the study to high rate of selection bias.

The wound infection rate reported in one case only drained group, calculation of p value was not applicable. Previous studies done by Coniglio et al (6), O'Keeffe et al, Cohen et al, and Reerds et al found that no difference in the rate of infection between drained and drainless parotidectomies (8-10).

Fray’s syndrome was reported in one case in drainless group. Calculation of P value was not applicable. Chua et al found no difference in the rate of Frey’s syndrome between drained and drainless parotidectomies (11).

Readmission was not reported in the current study, Reerds et al found that no difference in the rate of second admission between drained and drainless parotidectomies (10).

Post-parotidectomy complications can range in severity from mild ones like seroma or hematoma formation to more serious ones like damage to the facial nerve. Although it's unlikely to be the only factor, the choice to employ a drain may have an impact on the likelihood of some of these issues.

The rate of complications is Depending on the particular patient demographic, surgical methods, and post-operative care guidelines, the overall complication rates in the current study (33.3 percent for drains and 26.7 percent for drainless) fall within ranges reported in other studies. Drains, on the other hand, could aid in the early detection of issues like excessive bleeding or stop fluid buildups like seromas. The lack of a statistically significant difference in overall complication rates between the two groups suggests that using a drain has little to no impact on the surgery's overall risk profile.

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V. CONCLUSION

Both surgical procedures with and without drains had similar immediate post-operative results. Both groups had seroma, infection, and facial nerve paralysis, but Frey's syndrome was exclusive to the drainless group and hematoma to the drained group. Differences in complication rates across groups were not statistically significant.

Both groups were mostly male patients. Preoperative tumor diameters were somewhat bigger in the drained group, but the difference was statistically insignificant, indicating similar tumor features in both cohorts.

The drained group had a little longer average operational time, but not significantly. Both groups had similar post-operative hospital stays, demonstrating that drains do not significantly affect hospitalization time. Post-operative

Patients who had drains after parotidectomy had statistically substantially higher pain scores, indicating that drains may exacerbate post-operative discomfort. Follow-up and Re-hospitalizations. Both groups recovered well post-operatively, with no second admissions.

PRE-FORMA:

Details Response/Information
Patient ID _____
Preoperative Section
Name _____
Age _____
Gender ☐ Male
☐ Female
Regular medications ☐ Yes
☐ No
Symptoms _____
Parotid mass size (mm) _____
Postoperative Section
Duration (mins) _____
Drain used? ☐ Yes
☐ No
Stay duration (hours) _____
Pain Assessment (Scale 0-10) _____
Hematoma ☐ Yes
☐ No
Seroma ☐ Yes
☐ No
Infection ☐ Yes
☐ No
Facial nerve weakness ☐ Yes
☐ No
Frey's syndrome ☐ Yes
☐ No

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