

# EFFECT OF TRANS-SEPTAL SUTURE TECHNIQUE VERSUS NASAL PACKING AFTER SEPTOPLASTY

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**Abstract- Background:** Septoplasty is a common surgical procedure performed by otolaryngologists for the correction of deviated nasal septum. This surgery may be associated with numerous complications. To minimize these complications, otolaryngologists frequently pack both nasal cavities with different types of nasal packing. Despite all its advantages, nasal packing is also associated with some disadvantages. To avoid these issues, many surgeons use suturing techniques to obviate the need for packing after surgery.

**Objective:** To determine the efficacy and safety of trans-septal suture technique in preventing complications and decreasing morbidity after septoplasty in comparison with nasal packing. **Patients and methods:** Prospective comparative study. This study was conducted in the department of Otolaryngology - Head and Neck Surgery, Rizgary Teaching Hospital - Erbil, from the 6th of May 2014 to the 30th of November 2014.

A total of 60 patients aged 18-45 years, undergoing septoplasty, were included in the study. Before surgery, patients were randomly divided into two equal groups. Group (A) with trans-septal suture technique was compared with group (B) in which nasal packing with Merocel was done. Postoperative morbidity in terms of pain, bleeding, postnasal drip, sleep disturbance, dysphagia, headache and epiphora along with postoperative complications including septal hematoma, septal perforation, crustation and synechiae formation were assessed over a follow up period of four weeks.

**Results:** Out of 60 patients, 37 patients were males (61.7%) and 23 patients were females (38.3%). Patients with nasal packing had significantly more postoperative pain ( $P<0.05$ ) and a significantly higher incidence of postnasal drip, sleep disturbance, dysphagia, headache and epiphora on the night of surgery ( $P<0.05$ ). There was no significant difference between the two groups with respect to nasal bleeding, septal hematoma, septal perforation, crustation and synechiae formation.

**Conclusion:** Septoplasty can be safely performed using trans-septal suturing technique without nasal packing.

**Key words:** Septoplasty, nasal packing, trans-septal suturing technique.

**Aim of study** To determine the efficacy and safety of trans-septal suture technique in preventing complications and decreasing morbidity after Septoplasty in comparison with nasal packing.

## I. INTRODUCTION

As much as 75% to 80% of the general population is estimated to exhibit some type of anatomical deformity of the nose, most commonly a deviated nasal septum. This deviation results in a smaller nasal passage on one side or the other side, or even on both sides leading to nasal obstruction.<sup>1</sup>

Septoplasty is one of the commonest nasal surgeries performed by otolaryngologists,<sup>2</sup>

Until 3 or 4 decades ago, septoplasty was usually performed with a submucous resection (SMR) of the nasal

septum.<sup>3</sup> Scar formation and subsequent contraction of the fibrous tissues in the resected part of the septal cartilage were a frequent cause of saddling and retraction of the columella. Septal perforations were a common complication, in part due to drying of the opposing mucoperichondrium adjacent to the incision. Another drawback of this technique was that correction of pathology in the dorsal, caudal, inferior and posterior parts of the septum was not possible.<sup>4</sup> These criticisms led to the emergence of the septoplasty operation.<sup>5</sup>

The use of postoperative packing has been proposed to minimize postoperative complications such as haemorrhage, mucosal adhesions, and septal haematoma. Additionally, postoperative packing is believed to stabilize the remaining cartilaginous septum and minimize the persistence or recurrence of septal deviation. Numerous packing materials are available including ribbon gauze, fingerstall packs, polyvinyl acetate sponge (Merocel), cellulose sponges, and carboxymethyl-cellulose.<sup>6,7</sup> Merocel is the most commonly used commercial nasal pack available throughout the world.<sup>8</sup>

Despite these theoretical advantages, evidence to support the use of postoperative packing is lacking. Moreover, nasal packing is not an innocuous procedure. The most common morbidity associated with packing is postoperative pain.<sup>6,9</sup> Other complications attributed to post-septoplasty nasal packing are headache, sinusitis, and even bleeding.<sup>10</sup> Systemic complications induced by nasal packing include decreased sleep quality, respiratory problems and decreased oxygen saturation.<sup>11</sup> Toxic shock syndrome is the most serious complication which is also attributed to it. Besides, removal of nasal pack is often uncomfortable and painful for the patients and is often associated with bleeding.<sup>10,12</sup>

Intranasal (septal) splints have been used as an alternative to nasal packing to prevent intranasal adhesions and maintain septal stability.<sup>13</sup> They have the advantage that they can stay in the nose and allow the patient to breathe through the nose, thus prolonging the time the septum is supported,<sup>4</sup> but similar to nasal packing, septal splints have indicated morbidity.<sup>13</sup>

To overcome these issues, many surgeons use suturing techniques to obviate the need for packing after surgery.<sup>14</sup> Several suturing techniques have been described to approximate the mucosal flaps after septal procedures to reduce the complication rate.<sup>15</sup> In 1984, Sessions et al<sup>14</sup> reported continuous quilting suture using 4.0 plain catgut on a small cutting needle to approximate the mucosal flaps. A similar technique using a curved needle was described by Lee et al.<sup>15</sup> These techniques also help to close mucosal tears and support the remaining cartilage.<sup>16</sup>

So, the objective of this study is to compare the outcome of results in terms of complications by using either post-operative trans-septal suturing technique or nasal packing in septoplasty surgery. History of nasal packing is as old as that of septal surgery i.e. around 1800.<sup>17</sup> Most surgeons still routinely use nasal packing after septoplasty. The reasons for packing include:

Haemostasis, The prevention of septal haematoma, Increased mucoperichondrial flap apposition, The closure of dead space; and The prevention of the displacement of replaced cartilage.<sup>18</sup> Indications of Nasal Packing: Nasal packs are designed to: Provide hemostasis after Epistaxis or surgery .Provide support for the cartilaginous and bony nasal structure, nasal conchae or soft tissue (i.e. sliding flaps) ,Prevent adhesions or stenosis, especially following sinus surgery.<sup>19</sup> The ideal packs should be: Easy to insert and remove without causing discomfort. Comfortable when in place. Should prevent postoperative bleeding without damaging the mucous membrane of the nose. Should provoke minimal tissue reaction.<sup>6</sup> Complications of nasal packing: Nasal packing is not an innocuous procedure, and it may lead to several complications. The main disadvantage of packing is patient discomfort and the need for hospital stay.<sup>18</sup> Nasal packing has been reported as the leading cause of early postoperative pain,<sup>20</sup> and the removal of the packs is the most painful event in the postoperative period.<sup>6</sup> Others complications have been related to pack insertion, including vasovagal attack, cardiovascular collapse, hypovolemic shock, and nasovagal reflex, as well as trauma to the columella, nasal mucosa, and soft palate. Complications related to maintaining the pack include hypoxia and hypoxemia, which may lead to myocardial infarcts and cerebrovascular accidents, dysphagia, obstructive sleep apnoea (OSA), vestibulitis or sinusitis, toxic shock syndrome, Eustachian tube obstruction/Toynbee phenomenon that may lead to otitis media with effusion, acute otitis media, and hemotympanum. Late complications include adhesions, septal perforations, velopharyngeal incompetence or stenosis, and pack granuloma.<sup>21</sup>

## II. PATIENTS AND METHODS

**Study design:** This is a prospective comparative study conducted on 60 adult patients, 37 males and 23 females, in the department of Otolaryngology - Head and Neck Surgery, Rizgary teaching hospital - Erbil, from the 6th of May 2014 to the 30th of November 2014.

**Inclusion criteria:** Symptomatic deviated nasal septum, age of 18 years and above and both genders.

**Exclusion criteria:** History of previous nasal surgery, the presence of chronic rhinosinusitis with or without nasal polyposis, diabetic patients, uncontrolled hypertension, blood disorders and patients on anticoagulant therapy; hormonal therapy; aspirin intake or systemic steroids.

Informed consent was obtained from all the patients who were enrolled in the study prior to their enrollment. In the outpatient department, history was taken and a routine clinical assessment by anterior rhinoscopy and endoscopy was done. Nasal airflow was assessed by cottle test, forced cottle test and cotton wool test. Patients were investigated by: Haemoglobin, blood group and Rh, bleeding time, clotting time, blood sugar and virology screen. Patients above 35 years were assessed for: Blood urea, serum creatinine, chest x-ray and ECG.

Patients were randomly divided into two groups before undergoing septoplasty, each group included 30 patients:

- Group A (19 males, 11 females): trans-septal suture technique without nasal packing.
- Group B (18 males, 12 females): nasal packing (Merocel) only.

All septoplasties were performed under general anesthesia with endotracheal intubation. Patients were placed supine on a head ring in the reverse Trendelenberg position with head flexion from 15-30 degree. The septoplasty was done using a head light source. A 5 ml solution of 1/100,000 adrenaline and 2% lidocaine was used for infiltration. A caudal septal incision was made (hemitransfixion). The septum was approached by elevating the perichondrial flaps; the various septal parts were dissected free and mobilized by chondrotomies, as required. The deviated cartilage and bone had been removed, we tried to preserve cartilage as much as possible to prevent external nose deformation, then the incision was closed using 4/0 Vicryl sutures.

In group A, a trans-septal suture technique was used to closely appose the mucoperichondrial flaps following septoplasty. For this, sutures were applied about 1-2 cm apart by using 4/0 Vicryl (Figure 14). No nasal packing or splints were used in this group. In group B, a Merocel pack (PMSSteripack, EUROCELL NAZAL TAMPON) impregnated with an antibiotic eye ointment (Tetracycline) was inserted into each of the nasal cavities following septoplasty and let to expand and swollen by instillation of normal saline. It was removed on the morning of the 1st postoperative day (Figure 15).

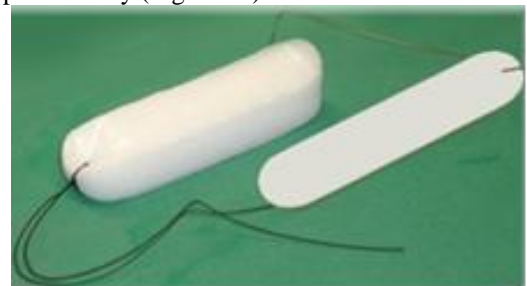


Figure (15) Merocel

All patients were monitored in the recovery room for about half an hour, then transferred to the ward where advised for elevation of the head of the patient about 30 degree.

Patients of both groups stayed in the ward for one night and discharged from the hospital in the morning of the 1st postoperative day. For the nasal packing group, packs were removed on the 1st postoperative day and discharged. Antibiotics were not prescribed for both groups; analgesics were prescribed for the patients after their discharge from the hospital 24 hours after surgery. All the patients were advised to use sea water spray.

Postoperatively, the subjective symptoms were evaluated, including postoperative nasal pain, nasal bleeding, postnasal drip, sleep disturbance, food intake and dysphagia, headache and epiphora. Each of these evaluations, except for epiphora, was performed using a visual analogue scale (VAS; a scale between 0 and 100; 0 nil, 100 very sever). Patients were interviewed regarding their symptoms on the 1st and 2nd postoperative days. One week postoperatively, patients were assessed for septal hematoma, nasal bleeding and nasal discharge. Complications such as crustations,

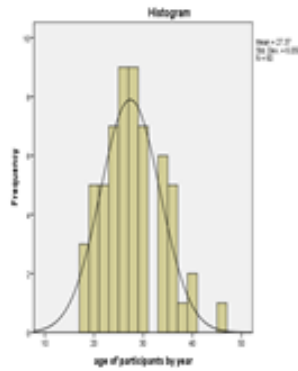
synechia and septal perforation were evaluated 4 weeks postoperatively.

Statistical analysis:- Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 20). Both T-Test (2 independent samples) and Chi square test of association were used to compare between proportions and means of the study groups. P-value of 0.05 or less was considered statistically significant.

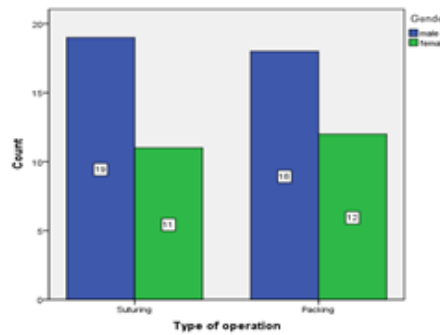
### III. RESULTS

The mean age ( $\pm$ SD) of the sample was  $27.37 \pm 6$  years, ranging from 18-45 years. The main age group was between 20-29 years (56.7%), as shown in scheme (1). There was a statistically non- significant association between different age groups and type of operation. Chi square test was used for analysis of data and P – value was 0.75.

Out of 60 patients, 37 patients were males (61.7%) and 23 patients were females (38.3%), as shown in scheme (2). The male to female ratio was estimated to be 1.6:1.



Scheme



Scheme (2) Gender

Postoperative nasal pain:

Table (1): postoperative nasal pain

Type of operation		1 <sup>st</sup> POD	2 <sup>nd</sup> POD
Suturing	Mean	22.67	16.00
	SD	6.397	6.747
Packing	Mean	38.33	26.67
	SD	9.129	9.223
<b>P – value</b>		0.001	0.001
<b>T – test</b>		Significant	Significant

The findings from table (1) and scheme (3) indicate that the level of postoperative nasal pain in both days was higher among packing group compared to suturing group. T – Test was done and there was strongly significant difference between the two groups in both first and second postoperative days. P – value was 0.001.

Postoperative nasal bleeding:

Table (2): postoperative nasal bleeding

Type of operation		1 <sup>st</sup> POD	2 <sup>nd</sup> POD
Suturing	Mean	12.33	6.33
	SD	6.261	4.901
Packing	Mean	15.33	7.67
	SD	9.371	5.683
<b>P – value</b>		0.15	0.33
<b>T – test</b>		Non - significant	Non - significant

The results of table (2) and scheme (4) show that there was no difference regarding postoperative nasal bleeding among suturing or packing groups on first and second days after the operation. However, patients in packing group experienced mild bleeding at the time of removal of nasal packs. Independent samples T – Test was used in both cases to compare the mean and it was  $>0.05$ .

Postoperative postnasal drip

Table (3): postoperative postnasal drip

Type of operation		1 <sup>st</sup> POD	2 <sup>nd</sup> POD
Suturing	Mean	19.33	11.00
	SD	7.397	4.807
Packing	Mean	28.00	18.33
	SD	7.611	6.989
<b>P – value</b>		0.001	0.001
<b>T – test</b>		Significant	Significant

The results from table (3) reveal that postoperative postnasal drip in both days was higher among packing group compared to suturing group. T – Test was done and there was strongly significant difference between the two groups. P – value was 0.001.

Postoperative sleep disturbance:

**Table (4): postoperative sleep disturbance**

Type of operation		1 <sup>st</sup> POD	2 <sup>nd</sup> POD
Suturing	Mean	19.00	11.67
	SD	7.120	4.611
Packing	Mean	33.00	13.00
	SD	10.22	6.513
<b>P – value</b>		0.001	0.36
<b>T – test</b>		Significant	Non-significant

As shown in table (4), there was a significant variation in postoperative sleep disturbance regarding both groups on the first day; those with packing experienced much sleep disturbance in comparison to suturing group patients. P – value was 0.001. This difference disappeared on the second day and P – value was 0.36.

Postoperative food intake and dysphagia:

**Table (5): postoperative food intake and dysphagia**

Type of operation		1 <sup>st</sup> POD	2 <sup>nd</sup> POD
Suturing	Mean	11.67	0.67
	SD	5.307	2.537
Packing	Mean	20.67	1.33
	SD	6.397	3.457
<b>P – value</b>		0.001	0.39
<b>T – test</b>		Significant	Non-significant

The findings in table (5) indicate that the level of postop. dysphagia in the first day was higher among packing group compared to suturing group. There was a significant difference between them and P – value was 0.001. In contrary, there was no difference among suturing or packing groups on the second day after operation. Independent sample T–Test used to compare the mean and it was 0.39.

Postoperative headache:

**Table (6): postoperative headache**

Type of operation		1 <sup>st</sup> POD	2 <sup>nd</sup> POD
Suturing	Mean	19.33	11.00
	SD	6.397	4.807
Packing	Mean	32.00	13.00
	SD	9.613	5.350
<b>P – value</b>		0.01	0.13
<b>T – test</b>		Significant	Non-significant

There was a significant variation in postoperative headache regarding both groups on the first day; those with packing experienced much headache in comparison to patients in suturing group, as shown in table (6). P – value was 0.01. This difference disappeared on the second day and P – value was 0.13.

Postoperative epiphora:

**Table (7): Association of epiphora with type of operation**

Type of operation	Epiphora		Total
	NO	Yes	
Suturing	26	4	30
Packing	0	30	30
<b>Total</b>	26	34	60

There was a statistically significant association between Epiphora and type of operation, as shown in table (7). Majority of suturing group (86%) did not develop epiphora while in contrast all patients in packing group developed it (100%). Analysis done by Pearson chi square test and P – value was 0.0001.

Evaluation at 1st postoperative week: There was no statistical significant difference between the two groups regarding nasal discharge on the first week after operation. Patients from both groups reported mild nasal discharge. P – value was 0.22, as shown in table (8).

**Table (8): postoperative nasal discharge**

Type of operation	N	Mean	Std. Deviation
Suturing	30	3.33	4.795
Packing	30	5.00	5.724

Nasal bleeding was not reported from any patient in both groups one week postoperatively. Only one patient from packing group developed septal hematoma which required incision and drainage under local anesthesia, as shown in table (9).

**Table (9): postoperative septal hematoma**

Type of operation	Septal hematoma		Total
	NO	Yes	
<b>Suturing</b>	30	0	30
<b>Packing</b>	29	1	30
<b>Total</b>	59	1	60

Evaluation at 4th postoperative week:

No significant difference between the two groups was seen with respect to complications including nasal crustation, synechiae formation and septal perforation. Septal perforation was not reported in any case postoperatively.

Crust formation was seen in two cases (6.7%) in suturing group and in 4 cases (13.3%) in packing group, P – value was 0.38, as shown in table (10).

**Table (10): postoperative nasal crustation**

Type of operation		4 weeks pop. Nasal crustation		Total	
		No	Yes		
Suturing	Count	28	2	30	
	%	93.3%	6.7%	100.0%	
Packing	Count	26	4	30	
	%	86.7%	13.3%	100.0%	
<b>Total</b>		Count	54	6	60
		%	90.0%	10.0%	100.0%

The majority of patients did not develop synechiae after four weeks of surgery. Only one patient (3.3%) in suturing group and 2 patients (6.7%) in packing group developed unilateral adhesions and P – value was 0.38 which was not significant, as shown in table (11).

**Table (11): postoperative synechiae**

Type of operation		Synechiae		Total	
		No	Yes		
Suturing	Count	29	1	30	
	%	96.7%	3.3%	100.0%	
Packing	Count	28	2	30	
	%	93.3%	6.7%	100.0%	
<b>Total</b>		Count	57	3	60
		%	95.0%	5.0%	100.0%

#### IV. DISCUSSION

The mean age of our patients was 27.37 years with a range between 18-45 years ( $\pm 6$  years). This is mostly because people in this period of their lives are more prone to accidents and traumas that will result in increased incidence of septal deviation. In study of Cukurova et al 201222; Günaydın et al 201123 the mean age of their patients was 28.9 years.

This study showed that male patients were 37 (61.7%) and female patients were 23 (38.3%). This distribution is approximate to that of Ansari et al 201324; 60% males and 40% females. The male to female ratio was 1.6:1 with slight male predominance which may be due to the small sample size because the incidence of septal deviation in the population is equal in both genders.

##### A. Postoperative pain

The level of postoperative nasal pain in both days was higher among packing group compared to suturing group. Packs were removed on the 1st postoperative day but the pain score was still higher in the packing group on the 2nd postoperative day compared to the suturing group. This is because of the pressure applied by the Merocel pack on the nasal walls, resulting in more pain sensation. This is in accordance with the results of Walikar 201111, a

comparative study of septoplasty with or without nasal packing, where 79.3% of patients with nasal packing experienced postoperative pain compared to only 25.7% of patients without nasal packing. A study done by Awan et al in 200825 on nasal packing after septoplasty: a randomized comparison of packing versus no packing in 88 patients showed that the most common pain scores were 10 in the packing group and one in the non-packing group. In a retrospective analysis of 697 septoplasty surgery cases: packing versus trans-septal suturing method which was done by Cukurova et al in 201222, the reported pain levels were 2.3 for suturing and 4.8 for packing on a scale of 1 to 10, indicating that the suturing group felt less pain than the packing group (P value < 0.05). Naghibzadeh et al10 conducted a study on 145 patients in 2011 which was "Does post septoplasty nasal packing reduce complications?" in which all patients in packing group (n=77) mentioned sever pain feeling while only 2 out of 68 patients without nasal packing felt such pain.

##### B. Postoperative bleeding:

There was no difference regarding postoperative nasal bleeding among suturing or packing groups on the first and second days after the operation. Ansari et al24 mentioned in their study "Trans-septal suturing technique without intra-

nasal packing in nasal septal surgery" that postoperative bleeding was noticed in 11.43% (n=8) in packing group, and 7.14% (n=5) in suturing group and the difference was not significant. Naghibzadeh et al10 reported only 3 cases that developed postoperative hemorrhage (2 from non-packing group and 1 from packing group) that needed nasal packing which was removed the day after. In Cukurova et al22 study, 4 patients (1.1%) in suturing group and 6 patients (1.8%) in packing group suffered post-septoplasty bleeding but the difference was not statistically significant. A review of the literature revealed no difference in bleeding if different packing materials are used or if no packing is used.<sup>35</sup>

#### C. Postoperative postnasal drip:

Postoperative postnasal drip in both days was higher among packing group compared to suturing group and the difference was strongly significant between the two groups. This is most probably due to the presence of the pack which acts as a foreign body, so the reaction of the nasal mucosa will be by increased secretions which in turn results in increased postnasal drip. This result is similar to that of Mo JH et al 200826 who conducted a study about no packing versus packing after endoscopic sinus surgery and found that postnasal drip on the 1st postoperative day was lower in the non-packing group. There is no study found in the literature comparing this variable between suturing and packing following septoplasty.

#### D. Postoperative sleep disturbance:

Patients in packing group experienced more sleep disturbance in the 1st POD compared to suturing group patients. This difference disappeared on the 2nd day, mostly due to removal of the pack as a cause of mechanical obstruction to the airway in the 1st postoperative day and also due to higher pain levels appreciated by packing group patients. This result is similar to that of other studies. For example, Awan et al 200825 found that 81.1% of patients in the packing group had less than 6 hours of sleep on the night of surgery, compared with only 15.9% in the non-packing group (P value <0.05), and Arafat Jawaid et al 201227 found in their study "Intranasal pressure splints - a reliable alternative to nasal packing in septal surgery" that 80% in the packing group had less than 6 hours of sleep on the night of surgery, compared with only 16.2% in the non-packing group (P value <0.05). Turhan et al28 examined the effects of using nasal packing or trans-septal sutures in septoplasty specifically on the polysomnographic parameters in the postoperative period in two different groups of young patients; the authors found a significant postoperative increase in the apnea-hypopnea index within the packing group. A study done by Daiya Asaka in 201129 disagreed with our results by finding insignificant difference that may be due to the use of sponge pack instead of Merocele pack which is smaller in size and causes less pressure with less harm to mucosa so less pain and minimal obstruction resulting in better sleep pattern.

#### E. Postoperative food intake and dysphagia:

Postoperative dysphagia in the first day was higher among packing group compared to suturing group. In contrary, there was no difference among suturing or packing groups on the second day after operation which can be explained as a result of removal of the pack that severely

affected the swallowing mechanism. If a patient swallows when the nasal passages are blocked (Toynbee maneuver), air can't pass anteriorly and it is insufflated into the middle ear. This unpleasant feeling results in poor oral intake while the packing is in place. Our study is in agreement with the study of Awan et al 200825 where 95.5% of patients said that they had difficulty in swallowing, whereas only 4.5% expressed this complaint in the non-packing group. Korkut et al30 conducted a study in 2010 on trans-septal suturing using a novel device versus nasal packing for septoplasty and found that no patient in suturing group had difficulty in swallowing. Daiya Asaka et al. 201129 contradicted these results as they found no statistical difference between non-packing group and packing group regarding postoperative dysphagia and this may be because they used sponge pack instead of Merocele pack, the latter may severely affect the nasopharyngeal and oropharyngeal closure reflex during swallowing as it causes complete obstruction of the airway unlike the sponge pack.

#### F. Postoperative headache:

Patients with packing experienced much more headache in the 1st POD compared to patients in suturing group. This difference disappeared on the second day due to pack removal because packing has more mass bulk which causes obstruction of sinus ostia and impaired ventilation with stasis of secretion, so patients become more liable for pain. This result is in accordance with the study of Awan et al 200825 as they found that 90.9% of patients in packing group experienced postoperative headache compared with 20.5% in the non-packing group. Korkut et al 200930 also found that 74% of packing group patients had headache compared with 29.7% in the suturing group. Another study done by Walikar et al11 in 2011 showed that the majority of packing group patients developed headache (61 out of 77) and only 19 patients out of 74 had such event in the non-packing group.

#### G. Postoperative epiphora:

There was a statistically significant difference between the two groups regarding this complaint as the majority of suturing group (86%) did not develop epiphora while in contrast all patients in packing group developed it (100%). In the study of Awan et al 200825, all patients in the packing group (100%) complained of excessive lacrimation, compared with only 11.4% in the non-packing group. Also our study agreed with that of Arafat Jawaid et al 201227 where they found that 80% of patients in the packing group complained of epiphora compared with 12.5% in the non-packing group. The excessive pressure of the Merocele pack within the nasal cavity resulted in obstruction of the nasolacrimal duct and diversion of lacrimal flow outside the nasal cavity.

#### H. Evaluation at 1st and 4th weeks postoperatively:

Regarding postoperative nasal discharge and local infection, although our patients didn't receive antibiotics postoperatively, this study showed no statistical significant difference between the two groups as patients from both groups reported mild nasal discharge. Awan et al 200825, Ardehali et al 200931, Kula et al 201032 and Günaydın et al 201123 showed similar results. A systematic review and meta-analysis done in Portugal in 2012 by Certal et al33

which included 8 randomized controlled trials with 869 patients showed a statistically non-significant 4% risk reduction in postoperative local infection for non-packing group.

Regarding septal hematoma, only one patient from packing group developed such complication. A possible explanation for this finding might be that the surgeon handled the septum roughly knowing that the packing would take care of any consequent bleeding. Cukurova et al 201222 reported no case with septal hematoma in their study. In the study of Ansari et al 201324, there was only one reported case of septal hematoma in the suturing group (1.43%) and no one in the packing group. Günaydin et al 201123 also mentioned two cases of septal hematoma in the suturing group and no one in the packing group. All these results are in agreement with our results.

No significant difference between the two groups was seen with respect to complications including nasal crustation, synechia formation and septal perforation.

Septal perforation was not reported in any case postoperatively. Kula 200932, Naghibzadeh 201110 and Günaydin 201123 showed nearly similar results in their studies. Cukurova et al22 reported 8 cases (2.2%) of septal perforation in the suturing group and 11 cases (3.2%) in the packing group among a total of 697 patients included in the study and the difference between the two groups was statistically not significant.

Crustation was seen in two cases in suturing group and in 4 cases in packing group. Postoperatively, all patients were instructed to perform frequent nasal irrigation with seawater spray and this is most probably the reason of such low incidence of nasal crustation. A study done by Thapa et al34 in 2011 "postoperative complications of septal quilting and BIPP packing following septoplasty" showed different results; 3 from 44 patients in suturing group developed crustation compared with 9 from 41 patients in BIPP group (P value =0.0043). A possible explanation might be that BIPP packs were removed after 48 hours of operation instead of 24 hours and BIPP packs causes more traumas to the mucosa than Merocel that resulted in more mucosal injury which affected the mucociliary clearance.

Unilateral intranasal adhesions were seen in one patient in suturing group and in 2 patients in packing group 4 weeks postoperatively. Nunez 199035, Kula 200932, Ardehali 200932 and Naghibzadeh 201110 mentioned data regarding the postoperative adhesions of the nasal mucosa for the non-packing and conventional packing groups. Their data showed a statistically non-significant risk reduction in the postoperative adhesions for the non-packing group. In the study of Awan 200825, the rate of adhesion formation was higher in the packing group than in the non-packing group (18.2% vs. 0%). It has been found that packing makes the nasal mucosa raw and actually more susceptible to synechia formation. Adhesions can be prevented without packing by careful handling of the septal mucosa, by avoiding manipulation of the turbinates, and by meticulous placement of instruments in the surgical site.

## V. CONCLUSIONS

- Septoplasty can be safely performed using trans-septal suturing technique without nasal packing, with better patient compliance and fewer chances of postoperative pain and discomfort, postnasal

drip, sleep disturbance, dysphagia, headache and epiphora.

- Trans-septal suturing technique has no obvious advantage over nasal packing in minimizing postoperative bleeding. Suturing technique and nasal packing showed similar risks for postoperative local infection, septal hematoma, septal perforation, crust formation and mucosal adhesions.

## VI. RECOMMENDATIONS

We recommend the use of trans-septal suturing technique after septoplasty as a safe alternative to nasal packing as it showed less postoperative morbidity in comparison with nasal packing.

This study had been carried out over a limited period of time comprising a limited number of cases. The facts mentioned here may considerably vary from a larger series. So, further studies with greater number of patients are necessary to find out the most appropriate method for controlling the postoperative sequel of septoplasty.

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