Study of nasal packing versus quilting following septoplasty surgery

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ABSTRACT

Introduction: Nasal packing is a commonly performed procedure after septoplasty. Quilting is alternative procedure which reduces the complications of nasal packing. This study aims to compare the post-operative outcome of quilting and nasal packing following septoplasty. **Methods:** This is a prospective comparative study carried on 80 patients divided into two equal groups who had undergone quilting and nasal packing randomly after septoplasty surgery for symptomatic deviated nasal septum. Post-operative nasal outcome score, pain, haemorrhage, anxiety, infection was compared between two groups at 1st, 3rd, 7th and 30th post-operative days. **Results:** There was significant improvement in nasal obstruction post-operatively in quilting group ($p<0.05$). Polyvinyl acetate sponge nasal packing group patients experienced significantly higher intensity of pain on 1st and 3rd post-operative days ($p<0.05$). Post-operative bleeding was also relatively higher in nasal packing group compared to quilting group at 3rd post-operative day. Patients had significantly higher levels of anxiety in the nasal packing group throughout a week post-operatively compared to the quilting group. Similarly, no statistically significant difference was noted in terms of adhesion between group A and group B on 7th and 30th post-operative day. **Conclusions:** Quilting technique following septoplasty showed higher improvement of post-operative nasal obstruction compared to Polyvinyl acetate sponge packing. It also decreased post-operative pain, bleeding, anxiety and adhesion. Quilting suturing following septoplasty can be recommended as an effective and comfortable alternative to nasal packing.

Keywords: Nasal packing, quilting, septoplasty.

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INTRODUCTION

About 65 to 70% of the general population have some anatomical deformity of the nose, most commonly deviated nasal septum (DNS).[1] The prevalence of DNS in Nepal was found to be 53%.[2] Most often DNS is asymptomatic, however it may cause nasal obstruction, headache, facial pain and epistaxis. Once symptomatic DNS is diagnosed, medical management targeting the nasal mucosa is attempted first. If the patient fails to respond to medical therapy, surgical management like septoplasty is considered to provide maximum respiratory improvement.[3]

Nasal packing is a commonly performed procedure after septoplasty. It can assure good flap apposition that prevent nasal bleeding, hematoma formation and adhesion.[4,5] Polyvinyl acetate sponge (PVA) is the most commonly used nasal pack available throughout the world.[6,7] PVAS packing can cause post-operative pain, mucosal injury, dryness of mouth, crusting, synechiae, secondary infection and prolonged hospital stay.[8]

Recent studies have focused on the other alternative approaches such as quilting that can significantly reduce the complications of nasal packing.[9] It provides approximation of the mucoperichondrial/ostial flaps.[10,11] It is important to do a comparative study between effect

of quilting and PVAS packing in our hospital set-up as it is one of the major tertiary care hospitals at western region of Nepal. This can help to distinguish the better option and recommendation for patient benefit on the basis of their safety and efficacy later on.

The aim of our study was to compare different post-operative effect like nasal obstruction, pain, nasal bleeding, anxiety and infection in both group after septoplasty.

METHODS

This prospective comparative study was performed at the Department of Otolaryngology and Head and Neck Surgery, Gandaki Medical College, Pokhara, Nepal from April 2020 to August 2021. Study protocol was approved by the GMC IRC review board (IRC-N 036/2076/207). The sample size was calculated based on an earlier study performed by Killera et al.[4] In his study, a total of 100 patients were included and equally divided into 2 groups.

$n= 2(z_\alpha + z_\beta)^2 S^2 / d^2$

Where, n = sample size, d =difference of mean to be detected z_α = 1.96 at 95% confidence interval, z_β = 1.28 at 90% power, S^2 (pooled variance) = $[\{S_1^2 (N_1-1) + S_2^2 (N_2-1)\} / \{(N_1-1)+ (N_2-1)\}]$, S_1 = transseptal suturing group SD= 1.5 S_2 = merocel nasal packing group SD = 1.93 N_1=50, N_2=50,d (difference of mean to be detected)= (4.75 – 3.46)= 1.2.

After calculation, sample size in each group was 37. So, the convenient sample was 40 in each group. Out of total 80 patients, 40 were allocated in Quilting technique (Group A) and 40 were in PVAS nasal packing (Group B) randomly by drawing a blind card from a box. Informed and written consent was taken from all the patients prior to study explaining the full procedure of septoplasty. Patients between 15 to 65 years ages with symptomatic deviated nasal septum having nasal obstruction, headache and epistaxis were included in study. Patients with other conditions such as acute and allergic rhinitis, vasomotor rhinitis, a history of hemorrhagic diathesis, and nasal polyp were excluded. All cases selected were subjected to detailed history and clinical examination. Cold spatula test followed by anterior rhinoscopy was done and details were noted. Deviation was noted as right or left or S shaped, depending on the side of deviation. All the cases were subjected to CT scan for further confirmative diagnosis and rule out other abnormalities. Nose obstruction symptoms score (NOSE) questionnaire form was filled in each patient preoperatively and also post-operatively on 1st, 3rd, 7th and 30th post-operative day.

Routine blood count, bleeding profiles, serology, Renal function test (RFT), random blood sugar performed for all selected cases. Additional investigations such as Electrocardiogram (ECG) and chest x-ray (CXR) were done for pre-anaesthetic checkup (PAC) investigations for cases to be done under general anesthesia.

Operative procedure: All patients had undergone septoplasty as a standard procedure by the faculty. Quilting was done in group-A, whereas PVA Sponge nasal packing was done in group-B. Surgery was performed under either general anaesthesia or local anaesthesia. The septum was infiltrated using 2% Lidocaine with 1:200,000 Epinephrine in the mucocutaneous junction, floor and septum bilaterally. Using a submucosal approach to the deviated nasal septum, Freer's/ Killian incision was given at the caudal end of the septum, in the side opposite to the deviation. Mucoperichondrial and mucoperiosteal flap was elevated. Chondrovomerine and chondromaxillary junction was identified and disarticulated and opposite flap was elevated. Deviated bony and cartilaginous parts was removed. A criss-cross incision was given in the remaining part of quadrilateral cartilage for correction of the deviated nasal septum with minimal incisions, trying to reshape and mould the most deviated part. after correction of the DNS. Quilting suture was applied over the septum with 4-0 vicryl round body in group A and PVA sponge nasal packing was done in group B.

Quilting Technique: A knot was placed in the distal end of the suture material. Needle with suture is passed in septum just anterior to anterior end of Middle turbinate. Counter pressure was applied from the opposite nostril to allow the needle to be passed to the nasal septum. Using continuous suturing technique, flaps were approximated as the needle is advanced towards the caudal end of the septum. As septal incision was approached, needle was placed just posterior to incision from the opposite nasal cavity and then anterior to incision so that suture is closed. Tooth forceps was used to knot itself on the fold of vestibular skin.

Post-operative evaluation: Patient were kept ceftriaxone 1gm iv TID and 500 mg iv TID post-operative period. Post-operative improvement of nasal obstruction was evaluated using NOSE score and compared its value with preoperative status. NOSE score assessment was also compared between both group A and B post-operatively i.e., Post-operative day (POD) 1st, 3rd, 7th and 30th day. Pain, haemorrhage, anxiety, infections and adhesions were noted in both groups at the post-operative 1st, 3rd, 7th and 30th post-operative day. Nasal bleeding was graded. Nasal pack was removed 48 hours after the procedure. The patients were discharged on 3rd post-operative or more as per required with analgesic (paracetamol tablet) and antibiotic (cefpodoxime with

clavulanic acid) in weight-related doses.

Visual analogue scale (VAS) is a psychometric response scale which can be used in questionnaires. This scale is helpful for patient self-reporting of pain and applied for adults and children 10 years old or older. [12]

Rating Pain Level

0 = No pain

1 to 3= Mild Pain

4 to 6=Moderate Pain

7 to 10=Severe Pain

Assessment of post-operative nasal bleeding was performed by grading as per done in the study by Baklaci et al.[13] Grade 0= No bleeding, Grade 1= bleeding limited to nasal cavity, Grade 2= bleeding out of nasal cavity, Grade 3= necessitated of repacking.

The anxiety of the patient was measured by Hamilton Anxiety Rating Scale (HAM-A) [14] which consists of 14 items. Each is defined by a series of symptoms, and measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety) Scoring- Each item is scored on a scale of 0 (not present) to 4 (severe), with a total score range of 0–56, where <17 indicates mild severity, 18 to 24 mild to moderate severity and 25 to 30 moderate to severe.

Post-operative nasal infection was assessed by nasal sign and symptoms like purulent discharge, disproportionate pain, swelling, nasal congestion, fever, malaise, headache. Then patients were evaluated for complications for synechiae in bilateral nasal cavities on the 7th and 30th post-operative day (POD). In follow-up, crusts were removed by suctioning and advised to continue nasal douching followed by the application of antibiotic ointment in the nasal cavity. Synechiae was released in OPD under local anaesthesia followed by the application of an antibiotic-soaked pack in the nasal cavity that will be removed only after 48 hours. These patients are advised for continuing nasal douching. These patients presenting with synechiae were called for examination at the interval of seven days till there were no signs of synechiae.

The data were collected on paper-based forms, then entered into Microsoft excel 2016, and analysis was done with statistical Package for Social Sciences version 26.0 for windows. Descriptive statistics were used to describe the frequency, mean, standard deviation with a 95% confidence interval. Student-t test and chi square test was used between the two groups. The p-value of <0.05 was considered statistically significant.

RESULTS

Total 80 patients were divided into two group, 40 (50%) patients underwent septoplasty with quilting (Group A) and 40 (50%) patients underwent septoplasty with PVAS nasal packing (Group B). The demographic of the patients was compared between both group which shows no significant variation of age, sex and DNS types of patients. (Table 1).

Table 1: Demographic details of patient of quilting and PVAS packing

Procedure		Quilting (A)	PVAS packing (B)	p-value
Age in year (mean± SD)		35.77 ± 16.30	32.15±12.37	0.244
Sex (M: F)		23:17	18:22	0.263
DNS Types	C-shaped	29/40=72.5%	31/40=77.5%	0.693
	S shaped	4/40=10%	6/40=15%	
	Spur	7/40=17.5%	7/40=17.5%	

Post-operative NOSE score was reduced significantly quilting group compared to pre-operative NOSE score of PVA group after septoplasty 1st, 3rd, 7th and 30th post-operative day.(p<0.001) (Table 2)

Table 2: Comparison of mean pre-operative and post-operative NOSE score by student t- test in each group

Procedure	Quilting group (A) Mean ± SD	PVAS packing (B) Mean ± SD	p-value
Pre-operative NOSE score	57.5± 12.14	59.87± 11.29	0.368
Post-operative NOSE score (POD1)	17.88 ± 4.78	100± 0.000	<0.001*
Post-operative NOSE score (POD3)	12.25± 4.37	28.25± 6.25	<0.001*
Post-operative NOSE score (POD7)	3.87± 3.29	9.75± 6.5	<0.001*
Post-operative NOSE score (POD30)	0.25± 1.33	1.37± 1.10	0.64

*p-value <0.05 signifies statistically significant

There was statistically significant difference noted in VAS pain score in between group A and group B on 1st POD and 3rd POD (p=0.001). On 1st POD, in quilting group 35(87.5%) patients had moderate level of pain and 5(12.5%) patients had severe pain whereas, in PVAS packing group 29(72.5%) had severe pain and 11(27.5%) had moderate level of pain. On 3rd POD, in quilting group 23(57.5%) patients had mild pain whereas, in PVAS packing group 21(52.5%) patients had mild pain, 16(40%) patients had moderate pain. There was statistically insignificant variation noted in VAS pain score in between group A and group B on 7th, 30th POD. (Table 3)

Table- 3: Comparisons of pain scale (VAS score)

	Quilting				PVAS packing				p-value
	No pain (0)	Mild (1-3)	Moderate (4-6)	Severe (7-10)	No pain (0)	Mild (1-3)	Moderate (4-6)	Severe (7-10)	
POD1	0	0	35 (87.5%)	5 (12.5%)	0	0	11 (27.5%)	29 (72.5%)	<0.001*
POD3	17 (42.5%)	23 (57.5%)	0	0	3 (7.5%)	21 (52.5%)	16 (40%)	0	<0.001*

POD7	34 (85%)	6(15%)	0	0	29 (72.5%)	11 (27.5%)	0	0	0.17
POD 30	40 (100%)	0	0	0	38 (97.5%)	2 (2.5%)	0	0	0.152

*p-value <0.05 signifies statistically significant

Bleeding was more in PVA group 22(55%) with grade II and 2(5%) at grade III compared to quilting group (18(45%) with grade II and 1(2.5%) at grade III) at 1st POD Bleeding was reduced at 7th POD on both group and there is no bleeding history at 30th post-operative day (Table 4)

Table 4: Distribution of grading post-operative bleeding in each group of surgery

Post-operative Days	Quilting				PVAS nasal packing				p- value
	Nasal bleeding grade				Nasal bleeding grade				
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 0	Grade 1	Grade 2	Grade 3	
POD1	21 (52.5%)	18 (45%)	1 (2.5%)	-	16 (40%)	22 (55%)	2 (5%)	-	0.49
POD3	36 (90%)	4 (10%)	-	-	16 (40%)	23 (57.5%)	1 (2.5%)	-	<0.001*
POD7	39 (97.5%)	1 (2.5%)	-	-	37 (92.5%)	3 (7.5%)	-	-	0.30
POD30	40 (100%)	-	-	-	40 (100%)	-	-	-	-

*p-value <0.05 signifies statistically significant

On 1st POD, in quilting group 32 (80%) patients had mild level of anxiety, 7 (17.5%) patients had moderate level of anxiety scale whereas, in PVAS packing group 28 (70%) patients had severe anxiety and 12 (30%) patients had moderate level of anxiety. There was statistically significant difference noted in Hamilton anxiety scale in between group A and group B. Anxiety level was decreased on 3rd and 7th POD in both group significantly lower in quilting group compared to PVAS groups. (Table 5)

Table 5: Distribution of post-operative grading of anxiety scale in both groups' patients

Post-operative days	Quilting				PVAS nasal packing				P-value
	HAM-A scale				HAM-A scale				
	No anxiety	Mild	Moderate	Severe	No anxiety	Mild	Moder-ate	Severe	
POD1	-	32 (80%)	7 (17.5%)	1 (2.5%)	-	-	12 (30%)	28 (70%)	<0.001*
POD3	10 (25%)	30 (75%)	-	-	1 (2.5%)	28 (70%)	11 (27.5%)	-	<0.001*
POD7	36 (90%)	4 (10%)	-	-	18 (45%)	22 (55%)	-	-	<0.001*
POD30	39 (97.5%)	1 (2.5%)	-	-	38 (95%)	2 (5%)	-	-	0.22

*p-value <0.05 signifies statistically significant

Post-operative infection found in 1 (2.5%) cases in each group at 3rd POD and one case only on quiliting group at 7th POD but no infection found on 1st and 3rd POD in both group. Only 2 (5%) and 5 (12.5%) cases had minimal adhesion in quilting and PVAS group respectively. At 7th POD which was statistically insignificant difference between both group (p=0.235). On 30th POD, in PVAS packing group only 1 (2.5%) had minimum adhesion in nasal cavity on follow up which was released by local infiltration.

DISCUSSION

Nasal packing has been used in septoplasty for many decades to prevent bleeding, hematoma, perforation, and to stabilize the cartilage and bony skeleton. However, there are several disadvantages of nasal packing like nasal pain, headache, oral breathing, vestibulitis, crusting, synechiae, infection, eustachian tube dysfunction.[15] Transseptal suturing technique has been described as a valid and comfortable alternative for PVAs packing. Quilting technique is method of doing postero-anterior continuous suturing technique following septoplasty described at various literature like Lee et al.[16] and Lemmens et al[17].

Mean age of our patients of quilting group was 35.77 ± 16.30 years and PVAs groups was 32 ± 12.37 years. We have compared the quilting with PVAS nasal packing following septoplasty in age, sex and severity of DNS match groups. Commonest type of DNS was C-shaped in both group; 29 (75.5%) in quilting versus 31(77.5%) in PVA packing. The study by Moorthy et al. found that 40% of patients had C-shaped DNS which was the most common in his study which is lower than our study[18].

There was a statistically significant difference between the mean pre-operative and post-operative NOSE score in both group A and group B in our study (p<0.001). The mean post-operative NOSE score in both group showed reduction as gradual improvement in nasal obstruction post-operatively and it was more better in quilting group compared to nasal packing group. Similar outcome was seen in study done by Abdullah et al. who found the NOSE scale values significantly higher in the nasal packing group on the post-operative 1st and 3rd days (p<0.001 and p<0.001, respectively), compared to quilting technique group.[19] The study by Shrestha et al. showed improvement of NOSE score pre-operatively and after three month respectively (45.58±21.38 versus 8.46±8.37) with nasal packing.[20]

Patients usually complained of mid-facial pain and frontal headache post-operatively. Patients experienced severe intensity pain 29(72.5%) in PVAS groups while only 5(12.5%) had severe intensity of pain in quilting group on 1st POD. A similar study performed by Sam et al, showed that pain is higher in nasal packing group in comparison to non-packing and was statistically significant (p=0.001).[1] Pain slowly decreased as post-operative day increased and after pack removal. We removed pack at 2nd POD. There was more pain on 3rd POD among PVAS packing group which may be due to mucosal injury during pack removal.

Majority of patients became painless at 7th POD among both group and was found to be statistically insignificant (p=0.17). But study by Schoenberg et al.,[21] Bajaj et al.,[2] and Samad et al.,[23] revealed that pain was a significant complaint in patients undergoing nasal packing following septoplasty on 7th POD. Almost all the patients became painless on 30th POD follow-up in both group.

Post-operative nasal bleeding is one of the fearful complications for patient and patient parties especially in developing countries. We graded post-operative nasal bleeding from grade (0) to (3) as per study done by Baklaci et al.[13] On 1st and 7th POD, there was higher grade of nasal bleeding in nasal packing group compared to quilting group but was found to be statistically insignificant. We removed the nasal pack after 48 hours of surgery routinely. We observed bleeding on 3rd POD. Almost 23(57.5%) patients had grade I and 1(2.5%) had grade II nasal bleeding that was controlled spontaneously. However, in quilting group 4(10%) had grade I bleeding which is limited to nasal cavity. This shows statistically higher bleeding noted at PVAS packing grouping on 3rd POD (p<0.001). In the study done by Walikar et al, post-operative bleeding was minimal on 3rd day in patients without nasal packing compared to patients with nasal packing. [6]

Hamilton Anxiety Scale (HAM-A) has been used to evaluate the level of anxiety level of which includes both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety)[4] On 1st POD, patients were highly anxious in PVAS nasal packing group seems to be triggered by serious pain, discomfort, respiratory problems, oral dryness, 28(70%) had severe anxiety and 12(30%) had moderate level while in quilting groups, only 1(2.5%) have severe anxiety and 7(17.5%) had moderate level. It showed statistically significant difference in anxiety level between both group on 1st POD (p<0.001). Our outcome is in concordance with the study done by Shariatpanahi et al.[24] in which comparison with suturing group, the average score for the level of anxiety was significantly higher in packing group during the 1st 24 hours (p<0.001) and one week after septoplasty compared to its counterpart (p=0.021). Significant reduction of the anxiety was noted on 3rd and 7th POD and more in quilting group. Our outcome is concordance with the study done by Sarik et al., whose State-Trait Anxiety Inventory clinical assessment state (STAI-S) scores were found to be 35 in transseptal suturing group and 43.8 (higher level in nasal packing group; the difference was found to be statistically significant (p < 0.05).[25] On 30th POD in both group A and group B, approximately all the patients were free of anxiety related to this procedure. In our study, it seems that quilting provided higher improvement in somatic status followed by psychological status post-operatively which directly affect the patient's attitude, feeling, emotional experiences, finally improving the quality of life and decrease anxiety.

We encountered a very limited rate of infection with insignificant variation between both groups. It might be due to no need of prolonged nasal packing in any case throughout our study and sufficient alkaline nasal douching with routine antibiotics prophylaxis. On 3rd POD, we found equal incidence of infection in both groups i.e., only one case in each group. On 7th POD, in quilting group there was one case of nasal infection which was due to poor nasal hygiene and crusting whereas in PVAS nasal packing group there was no any case of infection. These results are analogous with the previous meta-analysis by Certal et al., who reported that transseptal suture techniques showed similar risk of post-operative infection.[22]

Only 2(5%) had minimal adhesion in quilting, 5(12.5%) had adhesion in nasal packing group on 7th POD and 1(2.5%) patient had synechia on 30th POD. It was released locally as office procedure. It seems relatively higher rate of adhesion formation in nasal packing group although statistically insignificant. Similar outcome was seen in study done by Awan et al. and they reported that synechiae formation found in eight patients of nasal packing group and none of the patient shows synechiae in transeptal suturing group.[26]

Limitation of this study is the subjective scoring system like NOSE score, pain score, anxiety scaling depends on patient's intelligence which might bias our outcome. Maintaining the nasal hygiene is different in every patient after discharging from hospital which could also have bias our outcome.

Increasing our sample size in both quilting and PVAS nasal packing group would have better representative for high variation of outcome. We can recommend that practice of septoplasty with quilting technique is either equally efficient or even better in relation to post-operative pain, bleeding, anxiety, nasal obstruction as compared to septoplasty with PVAS nasal packing.

CONCLUSIONS

We found that NOSE score, pain, bleeding, anxiety, infection and adhesion formation lower in quilting technique compared with PVAS nasal packing. Quilting technique can be recommended as a safer, effective, comfortable and reliable alternative to PVAS nasal packing following septoplasty.

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REFERENCES

1. Sam A, Deshmukh PT, Patil C, Jain S, Patil R. Nasal septal deviation and external nasal deformity: a correlative study of 100 cases. Indian J Otolaryngol Head Neck Surg. 2012;64(4):312-8. DOI: 10.1007/s12070-011-0311-x PMID: 24294569.
2. Tiwari N, Budhathoki D, Shrestha I, KC G. Prevalence of deviated nasal septum among nepalese preclinical students at Kathmandu Medical College Teaching Hospital, Nepal. J Univers Coll Med Sci. 2018;6(2):60–3. DOI: 10.3126/jucms.v6i2.22498
3. Marple BF, Stankiewicz JA, Baroody FM, Chow JM, Conley DB, Corey JP, et al. Diagnosis and management of chronic rhinosinusitis in adults. Postgrad Med. 2009;121(6):121–39. DOI:10.3810/pgm.2009.11.2081 PMID: 9940423.
4. Killera S, Padmanabhan D, Viswanatha B. Nasal septal suture technique versus nasal packing after septoplasty: A prospective comparative study. J Oto laryngol ENT Res. 2018;10(1):00300. DOI: 10.15406/joentr.2018.10.00300
5. Lou Z, Lou ZH. Nasal packing and trans-septal suturing after septoplasty. European Archives of Oto-Rhino-Laryngology. Springer Verlag. 2018;275:53–5. DOI 10.1007/s00405-017-4811-5 PMID: 29147760.
6. Walikar BN, Rashinkar SM, Watwe M V., Fathima A, Kakkeri A. A comparative study of septoplasty with or without nasal packing. Indian J Otolaryngol Head Neck Surg. 2011;63(3):247–8. DOI: 10.1007/s12070-011-0141-x PMID: 22754803.
7. Bernardo MT, Alves S, Lima NB, Helena D, Condé A. Septoplasty with or without post-operative nasal packing: prospective study. Braz J Otorhinolaryngol. 2013;79(4):471–4. DOI: 10.5935/1808-8694.20130084 PMID: 23929148.
8. Yadav K, Ojha T, Gakhar S, Sharma A, Singhal A, Kataria V. Effectiveness of nasal packing in trans-septal suturing technique in septoplasty: a randomized comparative study. Indian J Otolaryngol Head Neck Surg. 2019;71(3):1765-1769. DOI: 10.1007/s12070-017-1111-8 PMID: 31763241.
9. Plasencia DP, Falcón JC, Barreiro SB, Bocanegra-Pérez MS, Barrero MV, Macías ÁR. Transeptal suturing - a cost-efficient alternative for nasal packing in septal surgery. Braz J Otorhinolaryngol. 2016;82(3):310–3. DOI: 10.1016/j.bjorl.2015.05.016 PMID: 26614045.
10. Bista M. A comparative study of pain and discomfort in septoplasty with quilting of nasal septum and nasal packing. Glob J Oto. 2018;13(4):555866. DOI: 10.19080/GJO.2018.13.555866
11. Ramalingam V, Venkatesan R, Somasundaram S, Kandasamy K, Rajeswari M. A comparative study between septal quilting sutures without nasal packing and only nasal packing post-septal correction,Indian J Otolaryngol Head Neck Surg. 2020;72(2):169–74. DOI: 10.1007/s12070-019-01730-x PMID: 32551273
12. Wang D, Liu T, Liao C, Tang G, Tian T, Tian L. Is nasal septal suturing an alternative technique to nasal packing ?: A protocol for systematic review and meta-analysis. Medicine. 2020;99(50):e23535. DOI: 10.1097/MD.0000000000023535 PMID: 33327302.
13. Baklaci D, Guler I , Kuzucu I , Kum RO, Ozcan,M. Comparison of the transseptal suturing with nasal packs after septoplasty. Med J. 2019;1;90–101. DOI: 10.33716/bmedj.567573
14. Sahin C, Aras HI. Effect on patient anxiety of lidocaine infiltration into nasal packing after septoplasty : prospective, controlled study. J laryngol Otol. 2015;129(8):784-7. DOI: 10.1017/S0022215115001644 PMID: 26118324.
15. Kim JS, Kwon SH. Is nonabsorbable nasal packing after septoplasty essential? A meta-analysis. Laryngoscope. 2017;127(5):1026–31. DOI:10.1002/lary.26436 PMID: 27900768.
16. Genç E, Ergin NT, Bilezikçi B. Comparison of suture and nasal packing in rabbit noses. The Laryngoscope. 2004;114(4):639-45. DOI:10.1097/00005537-200404000-00008 PMID: 15064616.
17. Cukurova I, Cetinkaya EA, Mercan GC, Demirhan E, Gumussoy M. Retrospective analysis of 697 septoplasty surgery cases: packing versus trans-septal suturing method. Acta Otorhinolaryngologica Italica 2012;32(2):111-14 PMID: 22767972.
18. Moorthy DNL. Clinical Significance of Anatomical Variations in Ostiomeatal Complex As Detected By MDCT. J Med Sci Clin Res. 2016;04(08):12078–83. DOI: 10.18535/jmscr/v4i8.67
19. Durmaz A. Nasal septal chain suture: a new suturing technique. J Craniofac Surg.2017;28(1):220-4. DOI: 10.1097/SCS.0000000000003279 PMID: 27941548.
20. Shrestha KK, Joshi RR, Rijal AS, Dhungana A, Maharjan S. Assessment of Septoplasty Outcome using Nasal Obstruction Symptom Evaluation Scale. Nepal Med Coll

J. 2019;21(2):142–6. DOI: 10.3126/nmcj.v21i2.25114

21. Schoenberg M Von, Robinson P, Ryan R.Nasal packing after routine nasal surgery-is it justified ? J Laryngol oto. 1993;107(10):902-5. DOI: 10.1017/S0022215100124740 PMID: 8263386.
22. Certal V, Silva H, Santos T, Correia A, Carvalho C. Transseptal suturing technique in septoplasty: a systematic review and meta-analysis. Rhinology. 2012;50(3):236-45. DOI: 10.4193/Rhino12.05 1 PMID: 22888479.
23. Bajaj Y, Kanatas AN, Carr S, Sethi N, Kelly G. Is nasal packing really required after septoplasty? Int J Clin Pract. 2009;63(5):757–9. DOI: 10.1111/j.1742-1241.2008.01799.x PMID: 18673397.
24. Shariatpanahi E, Yousefnejad S, Moradi A. Comparing the effect of septoplasty with and without nasal packing on outcomes and complications of surgery. J Adv Med Biomed Res. 2020;28(129):212–7. DOI: 10.30699/jambs.28.129.212
25. Sari K, Gul AI, Kantekin Y, Karaaslan O, Gencer ZK. Transseptal Suturing Reduce Patient Anxiety after Septoplasty Compared to Nasal Packing. Actamedica Hradec Kral. 2016;59(4):133–6. DOI: 14712/18059694.2017.40 PMID: 28440216.
26. Sohail Awan M, Iqbal M. Nasal packing after septoplasty: A randomized comparison of packing versus no packing in 88 patients. Ear Nose Throat J. 2008;87(11):624–7. DOI: 10.1177/014556130808701108