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A Comparative Study of Occlusive Nasal Packs, Internal Nasal Splints and Transseptal Suture Techniques after Septoplasty

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Abstract:
Background: *Septoplasty is a frequently performed rhinologic surgery. Anterior nasal packing been a routine procedure to prevent hematoma formation and to keep the nasal skeleton in place. However it comes at a price of extreme discomfort to the patient in immediate postoperative period and at time of its removal. There are alternatives to it in form of using internal nasal splints or taking transseptal sutures to serve the same purpose. This study was done to compare these three techniques in terms of effectiveness, postoperative discomfort and complications if any and to assess the need of routine nasal packing after septoplasty.*
Materials and methods: A prospective randomized controlled study was done over a period of one year, 60 patients were included and randomly allocated into three groups. Group A included those receiving occlusive nasal packing after septoplasty, Group B patients received internal nasal splints and in group C patients transseptal suturing was done. Patients were compared on basis of postoperative discomfort in terms of pain, headache, epiphora, discomfort while removing the pack or splint, complications like septal hematoma, septal abscess etc. Data were collected and analysed statistically.
Results: Mean pain score, edema of the face, epiphora, hypoxic spells were significantly more in Group A as compared to Group B and C. Difference in intraoperative time, incidence of septal hematoma, residual deviation, synechia were not statistically significant.
Conclusion: Occlusive nasal packs offer no significant gain over non packing techniques. Splints and transseptal suturing reduce postoperative pain, edema and should be considered better alternatives.
Key words: *Septoplasty, nasal splints, transseptal suturing*

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I. Introduction:

Septoplasty is routinely performed for symptomatic deviated nasal septum. It has evolved a lot but the goal is the same as it was 100 years ago, to maximize the symptomatic improvement and minimize the risks involved in such a pursuit. There are different ways to keep the septal skeleton in place during healing. An occlusive nasal pack can be put into the nose to bring the mucosa together, then the septum is squeezed between the blades holding the skeleton in place.

The disadvantages of anterior nasal packing are compromised nasal breathing, dryness of mouth, nasal pain, nasal valve narrowing, vestibulitis, crusting, synechiae, headache, watering from eyes, ear blocking, irritation of throat, difficulty in swallowing, hypoxia, hypoxemia, and secondary infection. It sssalso increases hospital stay. In addition to these, severe pain is experienced by the patient during pack removal. Although this discomfort is only for a short duration, patients clearly remember the painful experience.

To avoid nasal packing, people have successfully tried alternatives to traditional packs like using an internal nasal splint or through and through suturing of septal flaps with absorbable sutures.

Splinting by so called internal nasal splints is effective in stabilising reconstructions. They have the advantage that they allow the patient to breathe while being in place thus minimizing patient discomfort. The functions of the splint include the stabilization of the segments, bleeding control and

prevention of synechia formation. Transseptal mattress sutures have the same effect with even less occlusion of nasal cavities.

There were few studies comparing merits and demerits of these alternative techniques with the occlusive nasal packs, so we studied to compare these and assessed the need of routine packing after septoplasty.

II. Aims and Objectives:

1. To compare the outcome of occlusive nasal packs, internal nasal splints and transseptal suture after septoplasty in terms of effectiveness, postoperative discomfort and complications if any.
2. To assess the need of routine nasal packing after septoplasty.

III. Material And Methods:

STUDY AREA: Department of Otorhinolaryngology, Silchar Medical College and Hospital, Silchar.
STUDY PERIOD: 12 months (15 July 2016 – 14 July 2017)
SOURCE OF DATA: All the patients undergoing septoplasty at Department of Otorhinolaryngology, Silchar Medical College and Hospital, Silchar during the study period as per inclusion and exclusion criteria.
SAMPLE SIZE: 60
STUDY DESIGN : A prospective comparative study
SAMPLING METHOD : Simple Random Sampling
INCLUSION CRITERIA:
All patients with symptomatic DNS irrespective of age sex ethnicity undergoing septoplasty
EXCLUSION CRITERIA:
Patients with bleeding diathesis, other medical disorders
Patients with history of nasal polyposis, drug abuse (sniffers)
Patients using haemodiluting drugs
Patients with history of previous septal or turbinate surgery
Informed consent was taken from all the patients enrolled in the study prior to their enrollment. Detailed history and evaluation of the patients was done and data was collected.
VAS score (a scale of 0-10) was used to express parameters like pain and tenderness, headache and pain during removal of pack or splint. Continuous data were expressed as mead (SD) or as mean (range). Categorical data were expressed as percentages. Data were analyzed using SPSS version 21. Chi square test and one way ANOVA was used for analysis. P values <0.05 was considered statistically significant.

IV. Results:

1. Age distribution:

In this study, the age of the patients ranged from 11years to 60 years. Maximum number of cases were of age group 21-30 years (20cases, i.e. 33.3%) and the next most common age group was 31-40 years (13 cases, i.e. 21.6%). The mean age of presentation was 29.9 with standard deviation of 12.2.
Majority of the patients in each test group belonged to the age group of 21-30 years.

Age group	Occlusive Nasal Pack	Internal Nasal Splint	Transseptal Suturing
11-20 yrs	3	5	3
21-30 yrs	7	6	7
31-40 yrs	5	4	4
41-50 yrs	3	3	4
51-60 yrs	2	2	2
Mean age ± SD	33 ± 13.02	32 ± 13.21	33 ± 13.08

Table no. 1: Age distribution among different test groups

2. Intraoperative time:

The mean operative time taken to finish the surgery by the three different techniques were 36.35 mins in the occlusive nasal pack group, 34.25 mins in the internal nasal splint group and 38.7 minsin the transseptal suturing group. The difference between the means was found to be not significant.

Test Groups	Mean intraoperative time
Occlusive nasal packs	36.35mins ± 5.33
Internal nasal splints	34.25mins ± 4.03
Transseptal suturing	38.7mins ± 4.77
p- value (one way ANOVA)	0.014 (Not Significant)

Table no. 2: Mean Intraoperative time among test groups

Immediate Complications (within 48 hours of surgery)

3. Postoperative hypoxic spells:

Out of the 20 patients in the occlusive nasal pack group, 8 had episodes of hypoxia in the immediate post op period in the recovery room or in the ward. There were no such spells noted in the patients of internal nasal splints and transseptal suturing group.

Test Groups	No. of patients with Hypoxic spells	No. of patients without hypoxic spells	Percentage
Occlusive Nasal Packing	8	12	40%
Internal Nasal Splints	0	20	0%
Transseptal Suturing	0	20	0%
p- value(Chi square test)	<0.0001(Significant)		

Table no.3: Postoperative Hypoxic spells among patients in each test group

4. Sleep disturbance :

All the 20 patients in occlusive nasal pack group had moderate sleep disturbance. 11 in the internal nasal splint group and 5 in the transseptal group had mild sleep disturbance.

Test Groups	Sleep disturbance		
	None	Mild	Moderate
Occlusive nasal packs(n=20)	0	0	20
Internal nasal splint(n=20)	9	11	0
Transseptal suturing(n=20)	15	5	0
p- value (chi square test)	0.0001(significant)		

Table no.4: Degree of Sleep Disturbance among patients in each test group

5. Postoperative bleeding :

Out of the 20 patients in occlusive nasal pack group no one had bleeding in the postoperative period. 15 patients in internal nasal splint group and 16 in transseptal suturing group had minimal bleeding which required no active management and stopped on its own. 1 patient in internal nasal splint group and 3 in transseptal suturing group had moderate amount of bleeding which required injectable and/or topical haemostatics to control it. No patient had severe bleeding needing nasal packing.

Test Groups	No.of patients with Bleeding		
	Moderate	minimal	None
Occlusive nasal packs	0	0	20
Internal nasal splints	1	15	4
Transseptal suturing	3	16	1
p-value(Chi Square Test)	0.0001(Significant)		

Table no.5: Severity of Bleeding among patients in each test group

6. Pain and tenderness:

Complaints of pain on and around nose on 0^{th} and 1^{st} post-op day was evaluated using a VAS score. Patients in occlusive nasal pack group had a mean score of 7.25, patients with internal nasal splints had a score of 4.9 and that with transseptal suturing had 3.75. On applying one way ANOVA test, the difference between the means was found to be significant.

Test Group	Mean VAS score
Occlusive nasal pack	7.25±0.63
Internal nasal splint	4.9±0.55
Transseptal suturing	3.75±0.71
p- value (one way ANOVA)	<0.001(Significant)

Table no.6: Mean VAS score for Pain and Tenderness among patients in each test group

7. Headache:

Mean VAS score of headache in patients with occlusive nasal pack was 6.7 while that in internal nasal splints and transseptal suturing group was 3.3 and 2.35 respectively.

Test Groups	Mean VAS score
Occlusive nasal pack	6.7± 0.65
Internal nasal splints	3.3±0.73
Suturing	2.35±0.48
p- value (One way ANOVA)	<0.0001 (Significant)

Table no.7 : Severity of Headache among patients in each test group

8. Edema of the face:

10 patients in the occlusive nasal pack group had edema of the face in the post-operative period while only 1 patient in the internal nasal splint group and none in the transseptal suturing group had this complaint.

Test Groups	No. of patients with edema	No. of patients without edema	Percentage
Occlusive nasal pack(n=20)	10	10	50%
Internal nasal splint(n=20)	1	19	5%
Transseptal suturing(n=20)	0	20	0%
p- value(Chi square test)	0.0001(Significant)		

Table no.8: Incidence of edema of the face among patients in each test group

9. Epiphora was seen in 8 patients in the occlusive nasal pack group.

Test Groups	No. of patients with epiphora	No. of patients without epiphora	Percentage
Occlusive nasal pack(n=20)	8	12	40%
Internal nasal splint(n=20)	2	18	10%
Transseptal suturing(n=20)	0	20	0%
p- value(chi square test)	0.001(Significant)		

Table no.9: Incidence of Epiphora among patients in each test group

10. Post nasal drip :

In occlusive nasal pack group, 15 patients had complaint of post nasal drip, 7 patients in internal nasal splints group and 6 in transseptal suturimg group complained the same.

Test Groups	No. of patients with PND	No. of patients without PND	Percentage
Occlusive nasal pack(n=20)	15	5	75%
Internal nasal splints(n=20)	7	13	35%
Transseptal Suturing(n=20)	6	14	30%
p- value(Chi square test)	0.007(Significant)		

Table no.10: Incidence of Post nasal drip among patients in each test group

11. Difficulty in swallowing:

12 out of 20 patients with occlusive nasal pack reported difficulty in swallowing on 1st and 2nd post op day. 3 in the internal nasal splint group and 2 in the transseptal suturing group had similar complaints.

Test Groups	No. of patients with difficulty in swallowing	No. of patients without difficulty in swallowing	Percentage
Occlusive nasal pack	12	8	60%
Internal nasal splint	3	17	15%
Suturing	2	18	10%
p- value(Chi square test)	0.0006(Significant)		

Table no.11: Incidence of difficulty in swallowing among patients in each test group

12. Pain during removal of pack or splint :

There was no significant difference in mean VAS scores for pain during removal of occlusive nasal pack to that of internal nasal splints.

Test Group	Pain during removal (Mean VAS score)
Occlusive nasal pack	5.1±0.78
Internal nasal splints	2.1±1.46
p- value(t- test)	3.25(Not Significant)

Table no. 12: Pain during removal of pack or splint in respective test group

LATE COMPLICATIONS (on subsequent follow ups)

13. Septal haematoma:

On follow up after one week, no patients in any group had septal haematoma.

Test Groups	No. of patients
Occlusive nasal pack	0
Internal nasal splint	0
Transseptal suturing	0

Table no.13: Incidence of septal hematoma in each test group

14. Septal perforation:

There were no patients with septal perforation in any of the groups.

Test Groups	No. of patients	Percentage
Occlusive nasal packs	0	0%
Internal nasal splints	0	0%
Transseptal suturing	0	0%

Table no.14: Incidence of patients with septal perforation in each test group

15. Synechiae :

7 patients in the occlusive nasal pack group had synechiae on examination after one week of surgery. 4 patients in internal nasal splint group and 3 patients in transseptal suturing group had synechia. The result was found statistically significant.

Test Groups	No. of patients with synechiae	No. of patients without synechiae	Percentage
Occlusive nasal pack (n=20)	7	13	35%
Internal nasal splint (n=20)	4	16	20%
Transseptal suturing (n=20)	3	17	15%
p- value (Chi square test)	0.29 (Not significant)		

Table no.15: Incidence of Synechiae among patients in each test group

16. Crustation:

12 out of 20 patients in occlusive nasal group had crustation on 1 week follow up, 6 in the internal nasal splint group and 3 in the transseptal suturing group.

Test Groups	No. of patients with Crustation	No. of patients without Crustation	Percentage
Occlusive nasal pack	12	8	60%
Internal nasal splint	6	14	30%
Transseptal suturing	3	17	15%
p- value(Chi Square test	0.009(Significant)		

Table no.16: Incidence of crustation among patients in each test group

17. Residual deviation:

4 patients in occlusive nasal pack group, 3 in the internal nasal splint group and 3 in the transseptal suturing group had residual deviation at 4 months post op followup. The difference was not found to be significant.

Test Groups	No. of patients with residual deviation	No. of patients without residual deviation	Percentage
Occlusive nasal pack(n=20)	4	16	20%
Internal nasal splints(n=20)	3	17	15%
Transseptal suturing(n=20)	3	17	15%
p- value(Chi square Test)	0.886(Not Significant)		

Table No.17 : Incidence of patients with residual deviation in each test group

V. Discussion:

In the present study, a total of 60 patients with deviated nasal septum planned for septoplasty were selected as per the inclusion and exclusion criteria. All the patients were randomly allocated into three groups. First who would be given occlusive nasal packs, second with internal nasal splints and third who would be getting transseptal suturing after septoplasty as a measure to stop bleeding and to provide splintage to the newly corrected septum. Each group had 20 patients. Every patient was studied clinically and observed for immediate, early and late postoperative complications and residual deformity. The results were summarized in form of tables and charts and statistical analysis done. Below is a discussion of the results obtained in this study and its comparison with similar studies done by others.

Intraoperative time:

Mean intraoperative time taken to finish the procedure in occlusive nasal packs group was 36.35 minutes, in internal nasal splints group was 34.25 mins and in transseptal suturing group was 38.7 minutes. The difference between the means of nasal packing group and splints group were not found

to be significant whereas the difference between nasal packing group and suturing group was statistically significant.

This finding is supported by studies done by **M Ozkiris *et al***,(significant difference between suturing and packing or splinting group, not significant difference between packing and splinting group)[1], **Al-Raggad *et al*** (4 minutes more in suturing group)[2] and **Korkut A Y *et al*** (34.9 minutes in packing group and 37.8 minutes in suturing group)[3]

Immediate complications (within 48 hours of surgery)

Hypoxic spells and sleep disturbance

There were 8 patients in the nasal packing group who had hypoxic spells in the immediate postoperative period after reversal from anaesthesia or in the recovery ward which needed assistance. No patient with internal nasal splint group or in the transseptal suturing group had such episodes.

A study by **P F Jensen *et al*** showed significant increase in number of nocturnal episodes of hypoxia and a significant prolongation of mean duration of the individual hypoxic episodes in nasal packing group.[4]

Cayonu *et al* in his study concluded patients in merocel group were 3.6 times more likely to have respiratory distress.[5]

A study by **PriyoSakhi Devi *et al*** shows 72% patients in nasal packing group to have sleep disturbance as compared to 12% in the nonpacking group.[6]

Mohammad SA *et al* also had similar results with 81.8% in packing group to have sleep disturbance as compared to 15.9% in non packing group.[7]

In a study by **Said *et al*** mean postoperative discomfort on 1st post-op day was 11.67 in suturing group and 33.00 in packing group and the difference was significant.[8]

Awan *et al* in his study found 81.1% in the packing group had less than 6 hours of sleep on the night of surgery while only 15.9% of those in non packing group had such complaint.[9]

Arafat *et al* also had similar results with 80% of those in packing group having less than 6 hours of sleep compared to only 16.2% in splints group.[10]

Turhan *et al* examined the effects of nasal packing and transseptal suturing on polysomnographic parameters and found a significant increase in post-operative apnea-hypopnea index in the packing group.[11]

Epiphora

8 patients in the occlusive nasal pack group had watering from eyes in the evening of post-op day while only 2 of those in internal nasal splint group and none in the transseptal suturing group had this complaint.

Said *et al* in their study found 100% of patients with nasal packing to have epiphora while only 14% in the suturing group had it.[8]

Awan *et al* also had similar results with 100% of patients in nasal packing group having epiphora as compared to 11.4% in the non packing group.[9]

Arafat *et al* found 80% of patients in nasal packing group to have epiphora as compared to 12.5% in the non packing group.[10]

Wadhera R *et al* in his study found significantly fewer instances of watering from eyes among the internal nasal splints group as compared to the occlusive packing group.[12]

Wang M *et al* in his study got no significant difference between epiphora among nasal packing and transseptal suturing group.[13]

Edema of the Face

In our study 10 out of 20 patients in the occlusive nasal pack group had swelling of face and nose in the post-op period which was significantly more as compared to the internal nasal splint group (2 patients) and transseptal suturing group (0 patients).

R Wadhera *et al* in his study had similar findings with significantly more swelling of face and nose in the packing group as compared to the splint group.[12]

Post-nasal drip

15 patients in the occlusive nasal pack group had complaint of post-nasal drip as compared to 7 and 6 patients in the internal nasal splint and transseptal suturing group respectively.

Said *et al* in their study found strongly significant difference in post nasal drip among the packing (mean score of 28.00 on day 1 post-op) and suturing group (mean score of 19.33 on day 1 post-op).[8]

Similar results were found by **Mo JH *et al*** with lower post nasal drip among non packing patients on 1st post-op day.[14]

Difficulty in swallowing

In this study 60% of patients in nasal packing group had difficulty in swallowing, while only 15% in internal nasal splint group and 5% in transseptal suturing group had this complaint.

In a study by **Said *et al***, difficulty in food intake and dysphagia mean score was 11.67 in suturing group and 20.67 in packing group.[8]

Awan M S *et al* in their study found 95.5 % patients in nasal packing group having difficulty in swallowing as compared to only 4.5% in the packing group.[9]

Korkut *et al* in his study found that there was no dysphagia in the suturing group.[3]

Similar results were found in studies done by **R Wadhera *et al***, **Wang M *et al*** and **Nayak *et.al.***.[12,13,15]

Nasal packing severely affects the swallowing mechanism by hampering the nasopharyngeal and oropharyngeal closure reflexes. If a patient swallows when the nasal passages are blocked, air cannot pass anteriorly and insufflates the middle ear leading to an unpleasant feeling which discourages the patient to eat.

Post-operative bleeding:

Out of the 20 patients in nasal packing group none had bleeding in post-operative period. 75% patients in the internal nasal splint group and 80% in the transseptal suturing group had minimal bleeding which did not need any active management. 5% patients in internal nasal splint group and 15% in the suturing group had moderate bleeding which needed topical haemocoagulases and injectable haemostats to control the bleeding. No patient had severe bleeding which needed nasal packing.

In a study by **Gunyadin RO *et al*** minimal bleeding was significantly higher in suturing group as compared to packing group which had no bleeding.[16]

Study by **I Cukurova *et al*** showed 1.7 % of patients in packing group to have bleeding as compared to 1.1% in suturing group and the difference was not significant.[17]

Al- Raggad DR *et al* found 13 patients in the transseptal suturing group to have bleeding.[2]

Studies by **M T Bernardo *et al***, **Rajashri S Mane *et al***, **Muhammad Hafeez *et al*** had similar findings of more instances of bleeding among the non packing group.[18,19,20]

A study by **Priyosakhi Devi *et al*** shows 14% patients in the packing group and 18% in suturing group to have bleeding in the post-operative period.[6]

Pain and tenderness

In this study pain and tenderness on and around nose in the post-operative period was assessed using VAS (Visual Analogue Score). Mean pain score in the packing group was 7.25 which was significantly more than that in internal nasal splint group (4.9) and in transseptal suturing group (3.75).

M Ozkiris *et al* in their study comparing packs with transseptal suturing found mean post-op pain score in packing group to be 7.3, in splints group to be 6.1 and in suturing group 2.8.[1]

A study by **Said *et al*** says mean pain score among packing group to be 38.33 and that among suturing group to be 22.67.[8]

Study by **Priyosakhi devi *et al*** found 20% and 70% patients in packing group to have mild and moderate/severe pain in the post-operative period respectively.[6]

A study by **Walikar *et al*** found 79.3%patients with pack to have postoperative pain as compared to 25.7% in non packing group.[21]

Cukurova *et al* reported pain levels among suturing group to be 2.3 as compared to 4.8 for packing group and the difference was significant.[17]
Studies done by **M M Ardehalli *et al,* R Wadhera *et al*, Awan *et al*, Naghibzadeh *et al*, Wang M *et al*** and **V certal *et al*** had similar findings of significantly higher pain levels among the packing group.[22,12,9,13,23]

Headache
Mean VAS scores for post-operative headache in different groups in this study were 6.7 for nasal packing group, 3.3 for nasal splints group and 2.35 for transseptal suturing group.
Said *et al* in their study found a mean score of 32.00 in packing group and 19.33 in suturing group for post-operative headache.[8]
Awan *et al* also had similar results with 90.9% of patients in packing group to have headache as compared to 20.5% in non packing group.[9]
Korkut *et al* got 74% of patients in packing group to have headache as compared to 29.7% in suturing group.[3]
Wallikar *et al* had majority of patients in packing group (61 out of 77) developed headache as compared to non packing group (19 out of 74).[21]
Nayak *et al* also had findings of significantly higher incidence of headache in packing group as compared to splints.[15]
Nasal packing being more voluminous leads to blockage of sinus ostia, impaired ventilation and stasis of secretions leading to headache

Pain during removal of pack and splints
In this study mean pain scores during removal of pack or splint was 5.1 in packing group as compared to 2.1 in splints group. Transseptal suturing group did not have to undergo any removal so no such events were there in that group.
A study by **Mohammad SA *et al*** reported 45.5% of patients having severe pain during pack removal.[7]
Wang M *et al* found no significant difference between pain and bleeding during pack removal with that of suturing.[13]
Al- Raggad *et al* found bleeding during pack removal in 4 (4.8%) patients.[2]
R Wadhera *et al* noticed significantly lower mean scores for pain during pack removal in splints group.[12]
In a study by **M T Bernardo *et al*** 7.5% of patients reported moderate/intense pain during nasal pack removal.[18]

Late Complications (on subsequent follow ups)
Septal haematoma:
In this study there were no patients found with septal hematoma in any of the group on follow-up after one week.
In study by **Cukurova *et al*** there is no case with septal haematoma reported.[17]
Ansari *et al* reported one case (1.43%) with septal haematoma in suturing group and none in the packing group.[24]
Gunaydin *et al* mentioned 2 cases with septal hematoma in suturing group and none in the packing group.[16]
Al Raggad DR *et al* reported 4 (4.8%) patients in nasal packing group to have septal hematoma.[2]
V Certal *et al*, Awan M S *et al* and M M Ardehali *et al* in their studies did not find any significant difference in incidence of haematoma among the packing, splinting and suturing groups.[23,9,22]
Septal perforation:
There were no patients with septal perforation on 2 week follow up in any of the group.
Al Mazrou KA *et al* in their study concluded same scores for septal perforation in splinting and packing groups.[25]
M M Ardehali *et al*, V Certal *et al* had similar findings of equivalent rates of septal perforation between splints and pack groups and between packs and suturing group respectively.[22,23]

Synechiae

In this study 7 patients in the nasal packing group were found to have synechiae on their follow up visit after 1 week. 4 patients in the internal nasal splint group and 3 in the transseptal suturing group had similar complaint. There was significant difference between packing versus splinting and packing versus suturing group while no significant difference was seen among splinting and suturing group.

Al Raggad *et al* in his study reports 1 (1.1%) patient to have adhesions in the suturing group as compared to 5 (5.9%) in the nasal packing group.[2]

D Malki *et al*, Cook J A *et al*, Al Mazrou KA *et al*, M M Ardehali *et al* in their studies found no significant difference in terms of adhesions between the splints and suturing group.[26,27,25,22]

R wadhera *et al* reported 4 (13.5%) patients in nasal packing group to have adhesions as compared to zero patients in splints group.[12]

In the study by **K Naik *et al*** 12 patients in the nasal packing group had synechiae as compared to 1 patient in the suturing group.[28]

Said *et al* reported 1 patient in the suturing group to have adhesions as compared to 2 in the packing group.[8]

Cukurova *et al* in their study found 1.92% in suturing group to have synechiae as compared to 1.5% in packing group.[17]

In a study by **Priyosakhi devi *et al*** 8% and 10% patients at 2 and 4 week follow up in packing group had synechia in comparison to 6% and 2% in suturing group.[6]

Packing makes the nasal mucosa raw and more susceptible to synechiae formation. It can be avoided by careful handling of septal mucosa, avoiding manipulation of turbinates and by meticulous use of instruments during surgery.

Crustation

60% of patients in the nasal packing group had crustations in nose at 4 weeks follow up as compared to 30% and 15% in nasal splints group and suturing group respectively.

Said *et al* noted crustation in 4 cases in packing group and in 2 cases in suturing group.[8]

Thapa *et al* reported 3 out of 44 patients in suturing group to have crustation while 9 out of 41 patients in packing group had it.[29]

In a study by **Priyosakhi devi *et al*** 80% of patients in packing group had crustation and 84% in non packing group.[6]

K Naik *et al* in their study found 18 patients to have moderate crusting on day 4 in packing group compared to 6 patients in suturing group.[28]

Residual deviation:

In this study 4 patients in packing group and 3 patients each in splints and suturing group had residual deviation. The finding was not statistically significant.

In a study by **Al Ragged D R *et al*** 5 patients had residual deviation in each group.[2]

R wadhera *et al* reported 2 patients in splints group to have residual deviation at 6 week follow up as compared to 8 patients in packing group.[12]

Considering the degree of pain and discomfort associated with ooclusive nasal packing, silicone internal nasal splints with airway or transseptal suturing are suitable alternatives. Apart from minimal bleeding in the immediate postoperative period, no other significant disadvantage was found associated with splints or suturing. The rate of long term complications and residual deviation was almost similar in all three groups.

VI. Conclusion:

From the present study we can conclude that occlusive nasal packs after septoplasty cause great discomfort to the patients and have no advantage over internal nasal splints or transseptal suturing in terms of minimizing complications. Minimal bleeding in the postoperative period can be managed conservatively and hence precluding the need of packs. Internal nasal splints are a balance between totally occluding nasal packs and the without pack i.e. transseptal suturing group. It has the advantage of providing tamponade to stop the bleeding in the postoperative period as well as allowing the patient to breathe from his nostrils freely. However transseptal suturing gives best results in terms

of patient comfort. Hence we should avoid giving occlusive nasal packs in every case of septoplasty and reserve it for only those who are suspected to bleed heavily in the postoperative period. Internal nasal splints are a suitable alternative to these and in a carefully chosen case transseptal suturing will serve the purpose best.

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