

Research Article

A study of comparison between the efficacy of endoscopic septoplasty and traditional septoplasty

Pramod Kumar Yadav^{1*}, S.P. Agarwal², Veerendra Verma², Poonam Rani¹

¹Department of ENT, MRA Medical College, Ambedkarnagar, Uttar Pradesh, India

²Department of ENT, KGMU, Lucknow, Uttar Pradesh, India

Received: 21 June 2016

Accepted: 29 June 2016

*Correspondence:

Dr. Pramod Yadav,

E-mail: drpk Yadav853@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Endoscopic septoplasty is a minimally invasive technique that helps to correct deformity of septum under excellent visualization. This study was undertaken to evaluate the results of endoscopic septoplasty and correlated its efficacy with the traditional septoplasty operation for the correction of various nasal septal deformities.

Methods: The present hospital based one year study was conducted among 52 patients undergoing surgery for nasal septal deformity correction at the department of otorhinolaryngology, CSM Medical University, Lucknow, India to evaluate the results of endoscopic septoplasty and correlate its efficacy with the traditional septoplasty operations for the corrections of various nasal septal deviations.

Results: Maximum patients of DNS were males (73.07%). Majority (61.54%) presented with left sided DNS having most common symptom to be nasal obstruction (90.38%). Intraoperative complications were found to be higher in traditional septoplasty group as compared to endoscopic group. Maximum post-operative complications occurred in traditional septoplasty as compared to endoscopic septoplasty group. Nasal obstruction and headache were relived in endoscopic septoplasty group as compared to traditional group. Maximum patients (61.53%) of traditional group required longer stay in hospital after surgery. Endoscopic group of septoplasty showed more improvement and less complication in posterior deviations and spurs as compared to anterior deviations.

Conclusions: Overall this study showed better results and less complications in endoscopic septoplasty as compared to traditional septoplasty group as endoscopic septoplasty gave better illumination and improved access to high deviated nasal septum and allowed limited incision, limited flap elevation and achieved correction with least resection.

Keywords: Endoscopic septoplasty, Traditional septoplasty

INTRODUCTION

At birth, the nasal septum is usually straight and remains straight in childhood. As age progresses, there is tendency for the septum to bend on one side or other. Trauma during birth, including forceps placement or passage through a narrow pelvic canal, can cause injury that may lead to early septal deviation or to deviation that is not evident until the more active growth phase of

puberty. Minor trauma sustained early in life can be easily overlooked and frequently causes micro fracture of septal cartilage, healing of these micro fractures leads to bending of the cartilage away from the side of injury, when this occurs early in life, it may lead to asymmetric growth of the entire nasal structure as a result of chondrocyte growth interruption. Deviation may involve only the cartilage, bone or both the cartilage and bone. It may be: anterior dislocation, C-shaped deformity, S-

shaped deformity, spurs, thickening of septum. Deviated nasal septum presents mainly with nasal obstruction but may present with headache, nasal discharge, epistaxis, anosmia, external deformity, middle ear infections and sleep apnoea syndrome.

Patient complains of airway obstruction that is consistent with intranasal physical finding often indicating septoplasty and turbinate surgery. Septoplasty is a surgical procedure that corrects a deformity of the nasal septum. The usual purpose is to improve nasal breathing.¹ It is sometimes referred to as submucous resection of the septum (SMR) or septal reconstruction. The primary conditions that may suggest a need for septoplasty include: nasal air passage obstruction, nasal septal deformity, headache caused by septal spurs, chronic and uncontrolled nose bleeds, chronic sinusitis associated with a deviated septum, obstructive sleep apnoea, polypectomy, tumor excision, turbinate surgery and ethmoidectomy.

Surgery on a deviated nasal septum has changed a lot, starting from radical septal resection to mucosal preservation and subsequent presentation of possible septal framework, the latter giving rise to lesser complications. Numerous medical descriptions are available regarding the pathology and the treatment of the DNS. However, none of these descriptions have highlighted a complete surgical management of these conditions to improve the nasal airway. Each surgical procedure has its limitations and cannot deal with all the variants of the deformities of the nasal septum. An ideal surgical correction of the nasal septum should relieve the nasal obstruction, should be conservative, should not produce iatrogenic deformity, should not compromise the osteomeatal complex, should relieve all the contact areas and must have the scope for a revision surgery if required later.

The traditional surgeries of the nasal septum improve the nasal airway but do not fulfill the above mentioned criteria in most instances. The reasons outlined for this are, poor illumination, difficulty in evaluation of the exact pathology, need for nasal packing unnecessary manipulation, resection and overexposure of the septal framework reducing the scope for a revision surgery if required later. The nasal endoscope allows precise preoperative identification of the septal pathology and its associated lateral nasal wall abnormalities and helps in better planning of endoscope-aided septal surgery.² This technique is ultraconservative and fulfills the above mentioned criteria of an ideal septal surgery. Endoscopic septoplasty is a minimally invasive technique that helps to correct deformity of septum under excellent visualization.

Lanza et al and Stammberger et al initially described the application of endoscopic techniques to the corrections of septal deformity in 1991.^{3,4} Lanza et al also described a

detailed endoscopic to the treatment of isolated septal spurs.

Endoscopic septoplasty included both types of cases i.e. those with obstructive symptoms with more complex septal deformities and others where aim of the surgery was to improve surgical access to middle meatus as an adjunct to endoscopic dacryocystorhinostomy and endoscopic sinus surgery. When compared with standard head light technique, endoscopic septoplasty provides important advantages which include adequate visualization, room for instrumentation during functional endoscopic sinus surgery, access to para nasal sinuses and for other surgeries like trans-septal approach to the sphenoid sinus, visualization and stoppage of post-nasal bleeds. But before introduction of functional endoscopic sinus surgery, majority of septoplasties were done for nasal airway obstruction.⁵ Recently introduced into the rhino logic literature is the concept of limited septoplasty, example of which includes the cases where deviated nasal septum was revealed by nasal endoscopy.

Indications for endoscopic septoplasty include an isolated septal deformity or posterior septal deformity in a patient with densely adherent septal mucosal flaps, typically found in cases of revision septoplasty. The role of endoscopic septoplasty is limited in gross nasal septal deformity.

In this prospective randomized study carried out at tertiary referral center patients presenting with symptoms and signs of deviated nasal septum were selected. Patients of gross nasal septal deviations were not included. The aim was to identify nasal septal pathology in relation to lateral nasal wall in a precise way, correct the pathology and to correlate the efficacy of endoscopic septoplasty with traditional approach. The objectives of this study were to evaluate the results of endoscopic septoplasty and correlated its efficacy with the traditional septoplasty operation for the correction of various nasal septal deformities.

METHODS

The present hospital based one year study was conducted among the patients undergoing surgery for nasal septal deformity correction at the department of otorhinolaryngology, CSM Medical University, Lucknow, U.P., India after obtaining permission from the institution ethical committee. Fifty two cases of deviated nasal septum (DNS) especially mild and refractory to conservative medical treatment with long term nasal obstruction, headache, nasal bleeding and nasal discharge were selected from outpatient department of otorhinolaryngology and informed consent was obtained. Patients of deviated nasal septum, who were planned for nasal septal surgery and those aged more than seventeen years were included in this study. Patients with grossly deviated nasal septum, upper respiratory tract infection, allergic rhinitis, any nasal mass pathology and acute

rhinosinusitis were excluded. Patients were randomly divided into two groups. Twenty six cases were randomly selected for conventional septoplasty assigned to group A, the other twenty six underwent endoscopic aided septoplasty assigned to group B.

Data regarding clinical evaluation of the patient were recorded and analyzed at the end of study. A detailed history regarding presenting complaints, history of present illness with special notes of present or absence of symptoms, like nasal obstruction, nasal discharge, hyposmia, sneezing, nasal bleeding and post nasal drip were taken. The detailed general physical examination and examination of nose, throat and ear were carried out.

Besides routine hematological tests, X-ray of Para nasal sinuses- Water's view was done if needed. Pre-operative antibiotics were given. Standard techniques for conventional septoplasty and endoscopic septoplasty were used. Post-operative care was given.

RESULTS

Maximum patients were males (73.07%). Majority (51.92%) were aged between 17-26 years. A higher proportion of patients (61.54%) were with left sided deviated nasal septum (Table 1). Half of the total cases were having DNS on pre-operative endoscopic assessment (Table 2).

Table 1: Age and gender distribution in patients of deviated nasal septum (DNS).

| Age group (years) | Male | Percentage | Female | Percentage | Total number of cases | Percentage (%) |
|-------------------|------|------------|--------|------------|-----------------------|----------------|
| 17-26 | 19 | 36.53 | 8 | 15.38 | 27 | 51.92 |
| 27-36 | 14 | 26.92 | 4 | 7.69 | 18 | 34.61 |
| 37-46 | 3 | 5.76 | 1 | 1.92 | 4 | 7.6 |
| 47-56 | 2 | 3.84 | 1 | 1.92 | 3 | 5.7 |
| Total | 38 | 73.07 | 14 | 26.93 | 52 | 100.0 |

Table 2: Pre-operative endoscopic assessment of DNS.

| Endoscopic assessment | Number of cases | Percentage |
|---|-----------------|------------|
| DNS | 26 | 50.0 |
| Spur | 15 | 28.85 |
| DNS with maxillary crest | 6 | 11.54 |
| DNS with inferior turbinate hypertrophy | 4 | 7.69 |
| DNS with caudal dislocation | 1 | 1.92 |

Table 3: Symptoms of DNS.

| Symptoms (n=52) | Number of cases | Percentage |
|----------------------|-----------------|------------|
| Nasal obstruction | 47 | 90.38% |
| Headache | 28 | 53.84% |
| Nasal discharge | 22 | 42.30% |
| Nasal bleeding | 10 | 19.23% |
| Sneezing | 11 | 21.15% |
| Post nasal drip | 8 | 15.38% |
| Hyposmia | 1 | 1.9% |
| Middle ear infection | 4 | 7.6% |
| Cough/cold | 13 | 25% |
| External deformity | 2 | 3.85% |

Maximum (47/52) patients presented with nasal obstruction, headache (28/52), nasal discharge (22/52), nasal bleeding (10/52), recurrent cold and cough (13/52), sneezing (11/52) etc. (Table 3).

Patient of traditional septoplasty group present with intra-operative hemorrhage, 2 (7.6%) and with mucosal tear 2 (7.6%), while endoscopic septoplasty group presented with mucosal tear in 1 (3.85%) Statistically, no

significant difference was observed between two groups ($p > 0.05$) (Table 4).

Four patients out of 26 were presented with hematomas during post-operative an hour which was gradually resolved no patient of endoscopic septoplasty group developed haematoma. Early post-operative period which was gradually resolved, while there was no such case in endoscopic group. No patient was presented with anosmia in any group. Incidence of haematoma was significantly higher in group A as compared to group B ($p=0.037$) where 4 (15.38%) patients had haematoma whereas in group B, none of the patients had haematoma. There was one patient (3.8%) in group A showing dental anaesthesia while none in group B suffered from it, statistically no significant difference was seen between two groups ($p=0.313$).

Patients were presented with delayed complications like synechiae. In traditional septoplasty group 3/26 (11.53%) while in endoscopic group (3.8%). Two patients were presented with residual deviation after 3 months of evaluation, in tradition septoplasty group-2/36 (7.6%), while one patient of endoscopic group was presented with residual deviation (1/26-3.85%). There was no patient presented with septal perforation in both two groups.

Patients of Group A with synechiae formation 3 (11.53%), residual deviation after 3 months 2 (7.6%) while in endoscopic group only 1 (3.8%) patient was found with synechiae formation. Statistically no significant difference was seen between two groups ($p > 0.05$) (Table 5).

Table 4: Intra-operative complications.

| Complication | Group A (traditional septoplasty) | Group B (endoscopic septoplasty) | χ^2 | p-value |
|--------------|-----------------------------------|----------------------------------|----------|---------|
| Hemorrhage | 2(7.6%) | 0 (0.0%) | 2.08 | 0.149 |
| Mucosal tear | 2(7.6 %) | 1 (3.85%) | 0.353 | 0.552 |

Table 5: Post-operative complications.

| Complication | Group A (traditional septoplasty) | Group B (endoscopic septoplasty) | χ^2 | p-value |
|--------------------|-----------------------------------|----------------------------------|----------|---------|
| Haematoma | 4 (15.38%) | 0 (0.0%) | 4.333 | 0.037 |
| Dental anesthesia | 1 (3.8%) | 0 (0.0%) | 1.019 | 0.313 |
| Synechia | 3(11.53%) | 1 (3.8%) | 1.083 | 0.298 |
| Residual deviation | 2 (7.6%) | 1 (3.85%) | 0.354 | 0.552 |

Residual deviation

None of the Group A patients with anterior deviation had residual deviation whereas in Group B 1/8 (12.5%) showed presence of residual deviation. Among posterior deviation patient, none the patients of Group A

1/8 (12.5%) patients showed residual deviation. Among spur patients, none of the Group B patients showed residual deviation whereas 1/7 (14.29%) of Group A patients showed residual deviation. Statistically, no significant difference was seen between two groups as regards presence of residual deviation ($p < 0.05$) (Table 6).

Table 6: Objective assessment in different types of deviations.

| Type of deviations | Group A (traditional septoplasty) | Group B(endoscopic septoplasty) | χ^2 | p-value |
|---------------------------|-----------------------------------|---------------------------------|----------|---------|
| Residual deviation | | | | |
| Anterior deviations | 0/11 | 1/8 | 1.451 | 0.228 |
| Posterior deviations | 1/8 | 0/10 | 1.323 | 0.250 |
| Spur | 1/7 | 0/8 | 1.224 | 0.228 |
| Synechia | | | | |
| Anterior deviations | 0/11 | 1/8 | 1.451 | 0.228 |
| Posterior deviations | 1/8 | 0/10 | 1.323 | 0.250 |
| Spur | 1/7 | 0/8 | 1.224 | 0.268 |

Table 7: Post-operative symptoms relieved.

| Symptoms | Group A (traditional septoplasty) | Group B (endoscopic septoplasty) | χ^2 | p-value |
|-------------------|-----------------------------------|----------------------------------|----------|---------|
| Nasal obstruction | 19/23 (82.6%) | 23/24 (95.83%) | 2.160 | 0.142 |
| Headache | 9/12 (75%) | 15/16 (93.75%) | 1.969 | 0.161 |
| Nasal discharge | 10/13 (76.92%) | 8/9 (88.9%) | 0.512 | 0.474 |
| Nasal bleeding | 3/6 (50%) | 2/4 (50%) | 0 | 1 |

Table 8: Post-operative stay of the patients.

| Duration (hours) | Group A (traditional septoplasty) | Group B (endoscopic septoplasty) |
|------------------|-----------------------------------|----------------------------------|
| <48 | 10 (38.46%) | 23 (88.46%) |
| 48-72 | 12 (46.15%) | 3 (11.53%) |
| >72 | 4 (15.38%) | 0 (0.0%) |

$\chi^2 = 14.52$ (df=2); $p < 0.001$

Presence of synechia

None of the posterior deviation or spur patients in Groups B showed presence of synechia whereas 1/8 (12.5%) and 1/7(14.29%) patients of posterior deviation and spur respectively showed presence of synechia. However,

none of the anterior deviation patients in Group A showed presence of synechia in contrast to 1/8 (12.5%) of Group B patients who showed presence of synechia. Statistically, no significant difference was seen between two groups ($p > 0.05$) (Table 6).

After 90th day follow up, patient with nasal obstruction showed more improvement in endoscopic septoplasty, 95.83% comparative to traditional (82.6%), headache also more improved in endoscopic septoplasty (93.75%) while in traditional 75%. Statistically no significant difference was seen between the two groups ($p > 0.05$) (Table 7).

Patients of traditional septoplasty group required longer hospital stay 16/26 (61.53%) while in endoscopic group only 3/26 (11.53%) patients required longer stay. Statistically a significant difference was seen between two groups, it as seen that patients with endoscopic septoplasty had significantly shorter stay as compared to traditional septoplasty ($p < 0.001$) (Table 8).

DISCUSSION

Deviated nasal septum in relation to age

In the present study, deviated nasal septum were encountered more (51.92%) in 17-26 years group. Subaric M et al in 2002 conducted a study among 1797 randomly selected subjects and found the prevalence of nasal septum deformities to be 40.6% in the 15-18 years group and 41.8% in the 19-22 years group which is similar to this study.⁶

Deviated nasal septum in relation to gender

In the present study, deviated nasal septum was encountered more frequently in males (Male:Female ratio 2.71:1). Tocik et al, showed DNS 3 or 4 times more common in men.⁷ Min et al did a study, in different places, with 9284 volunteers in Korea, showing the prevalence of deviated nasal septum (DNS) in 22.38% of the population, with predominance in men.

Deviated nasal septum in relation to laterality

In the present study, 32 out of 52 patients (61.54%) presented with left sided deviated nasal septum while 20 out of 52 patients (38.16%) presented with right sided deviation, it shows the prevalence of deviation, it shows the prevalence of deviated nasal septum is more to left side. Perth et al examined new born infants and found nasal obstruction in 21% cases out of which 41% was right sided and 59% left sided.⁸

Deviated nasal septum related to symptoms

In the present study, maximum patients presented with nasal obstruction 47/52 (90.38%) followed by headache-28/52 (53.84%). Anterior nasal discharge 42.3%, nasal bleeding 19.23%, sneezing 21.1%, post-nasal drip 15.38%, recurrent cold and cough 25% etc.

Peacock MR et al, Koch HN et al, Low WK et al reported headache as a secondary symptom to nasal obstruction owing to septum deviation in rates that range from 23%

to 58%, and its surgical correction would lead not only to improvement of nasal obstruction, but also headache.^{9,10,11}

In relation to intraoperative complication

Patients of traditional septoplasty group presented with intra-operative hemorrhage in two (7.6%) patients and mucosal tear in two (7.6%) patients while endoscopic septoplasty group presented only with mucosal tear in 1 patient (3.85%). Statistically, no significant difference was observed between two groups ($p = 0.552$) but it shows more complication in traditional group.

Post-operative bleeding following nasal surgery has been reported as being as high as 5.4% but this was in association with a septo-plasty being performed.¹²

In relation to post-operative early complication

In early Post-operative period, incidence of hematoma was significantly higher in group A as compared to group B. 4/26 (15.38%) patients have hematoma in group A while none patient with hematoma in group B (endoscopic septoplast). This is due to poor illumination, excessive resection which leads to chance of mucosal tear, hemorrhage, it may cause mucosal edema and hematoma in Group A while in Group B illumination is good, resection is limited so chance of mucosal tear reduced which further reduced chance of hemorrhage and hematoma.

In relation to post-operative delayed complication

Patient of group A was found with synechiae formation 3 (11.53%), residual deviation after 3 months 2 (7.6%) while in endoscopic group only 1 (3.8%) patient was found with synechia formation, I found with residual deviation. But no significant difference was seen between groups ($p > 0.05$), it shows more delayed complication in Group A. Study of Gupta M et al study shows complication rate were significantly more in traditional group.¹³ In above study, more complication in group A which showed clinically significant but statistically it did not attain significance except in cases of hematoma where it was significant ($p = 0.037$). It showed study on larger group is needed to further highlight and prove this point statistically.

In relation to post-operative hospital stay of the patient

Patient of traditional septoplasty group required longer hospital stay 17 (16.73%) while in endoscopic group only 3 (11.53%) required longer stay. Statistically a significant difference was seen between two groups ($p < 0.001$). It was due to longer stay in tradition group due to post-operative bleeding, lip edema and hematoma formation while endoscopic group, less chance of such complication.

In relation to objective assessment in different deviations

Patients of traditional septoplasty group with anterior deviation had no residual deviation while in case of posterior deviation and spurs patient showed residual deviation 1/8 (12.5%) and 1/7 (14.29%) respectively in endoscopic septoplasty group patient showed residual deviation only in cases of anterior deviation type 1/8 (12.5%).

Clinically it showed that endoscopic group septoplasty is more better in posterior deviations and spurs while traditional septoplasty is more better in anterior deviations but statistically, no significant difference was seen ($p > 0.05$). It showed study on larger group is needed to further highlight and prove this point statistically.

None of the group A patients with anterior deviation had residual deviation whereas in group B 1/8 (12.5%) showed presence of residual deviation. Among posterior

deviation patients, none of the patients of group B showed residual deviation whereas in group A 1/8 (12.5%) patients showed residual deviation. Among spur patients, none of the group B patients showed residual deviation whereas 1/7 (14.29%) of group A patients showed residual deviation. Statistically, no significant difference was seen between two groups as regards presence of residual deviation ($p > 0.05$).

Presence of synechiae

None of the posterior deviation or spur patients in Group B showed presence of synechiae whereas 1/8 (12.5%) and 1/7 (14.29%) patient of posterior deviation and spur respectively showed presence of synechie. However, none of the anterior deviation patients in Group A showed presence of synechiea in contrast to 1/8 (12.5%) of group B patients who showed presence of synechiae. Statistically, no significant difference was seen between two groups ($p > 0.05$).

Table 9: Post-operative stay of the patients.

| Duration (hours) | Gupta et al (2005) ¹³ | | Present study (2008) | |
|------------------|-----------------------------------|----------------------------------|-----------------------------------|----------------------------------|
| | Group A (Traditional septoplasty) | Group B (Endoscopic septoplasty) | Group A (Traditional septoplasty) | Group B (Endoscopic septoplasty) |
| <48 | 80% | 96% | 38.46% | 88.46% |
| 48-72 | 8% | 4% | 46.15% | 11.53% |
| >72 | 12% | 0 | 15.38% | 0 |

Table 10: Post-operative symptoms relieved.

| Symptoms | Gupta et al (2005) ¹³ | | Present study (2008) | |
|-------------------|-----------------------------------|----------------------------------|-----------------------------------|----------------------------------|
| | Group A (traditional septoplasty) | Group B (endoscopic septoplasty) | Group A (traditional septoplasty) | Group B (endoscopic septoplasty) |
| Nasal obstruction | 84% | 96% | 82.6% | 95.83% |
| Headache | 92% | 100% | 75% | 93.75% |
| Nasal discharge | 76% | 88% | 76.92% | 88.9% |
| Nasal bleeding | - | | 50% | 50% |

In endoscopic group of patients, more improvement in the posterior deviation and spur was seen in comparison to traditional group of patients.

The study of Nayak et al showed only about 10% patients of anterior deflection had persistent septal deformity and posterior deviations/ spurs were effectively corrected in most of the cases.¹⁴

The study of Gupta M et al, Nayak et al both study showed traditional group patients required longer stay due to bleeding or lip edema.^{13,14}

In relation to post-operative subjective improvement

After 90th day follow up, patient with nasal obstruction and headache showed more improvement in endoscopic septoplasty group. Clinically, it was significant but statistically no significant difference was seen between the two groups ($p > 0.05$).

The study of Nayak et al showed endoscope aided septoplasty was found to be more effective in treating symptom such as nasal obstruction and headache. In this 'p' value was significant i.e. < 0.02 and < 0.05 respectively. The study of Gupta M et al showed more number of patients being relieved of presenting complaints in endoscopic group but it was not statistically significant, p value for nasal obstruction=0.15, p value

for nasal discharge=0.27.^{13,14} In the present study, p value for nasal obstruction 0.142 and for headache it was 0.16, it was close to above study and showed, study on larger group is needed to further highlight and prove this point statistically.

CONCLUSION

The study showed better results and less complication in endoscopic septoplasty as compared to traditional septoplasty group as endoscopic give better illumination and improved access to high deviated nasal septum and allows limited incision, limited flap elevation and achieves correction with least resection. This technique causes fewer traumas to the septum, thus reducing the post-operative complication.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Siegel NS, Gliklich RE, Taghizadeh F, Chang Y. Outcomes of septoplasty. Otolaryngol Head Neck Surg. 2000;122(2):228.
2. Nayak DR, Balakrishnan MS, Murthy MS. An endoscopic approach to the deviated nasal septum-a preliminary study. J Laryngol Otol. 1998;112:934-99.
3. Lanza DC, Kennedy DW, Zinreich SJ. Nasal endoscopy and its surgical application. In: Essential Otolaryngology. Head and Neck Surgery. 5th edition. New York: Medical examination;1991:373-87.
4. Stamberger H. Functional endoscopic sinus surgery. Decker BC. Philadelphia;1991:156-9.
5. Cantrell H. Limited septoplasty for endoscopic sinus surgery. Otolaryngol Head Neck Surg. 1997;116:274-7.
6. Subaric M, Mladina R. Nasal septum deformities in children and adolescents: a cross-sectional study of children from Zagreb. Croatia Int J Pediatr Otorhinolaryngol. 2002;63(1):41-8.
7. Tocik J. Relation between deviation of the nasal septum and diseases of the paranasal sinuses. Cesk Otolaryngol. 1989;38:41-4.
8. Bhattacharjee A, Uddin S, Purkaystha P. Deviated nasal septum in the newborn-a 1 year study. Ind J Otolaryngology Head Neck Surg. 2005;57(4):304-8.
9. Peacock MR. Submucous resection of the nasal septum. J Laryngol Otol. 1981;95:341-56.
10. Koch HN, Gammelgaard N, Hvidegaard T, Stockted P chronic headache: the role of deformity of the nasal septum. British Med J. 1984;288:434-5.
11. Low WK, Willatt DJ. Headache associated with nasal obstruction due to deviated nasal septum. Headache. 1995;35(7):404-6.
12. Postoperative bleeding following nasal surgery has been reported as being as high as 5.4% but this was in association with a septoplasty being performed. Ann R CollSurg Engl. 2000;82:327-30.
13. Gupta M, Motwani G. Comparative study of endoscopic aided septoplasty and traditional septoplasty in posterior nasal septa deviations. Ind J Otolaryngol Head Neck Surg. 2005;57:309-11.
14. Nayak DR, Balakrishnan MS, Murthy MS. An endoscopic approach to the deviated nasal septum-a preliminary study. J Laryngol Otol. 1998;112:934-99.

Cite this article as: Yadav PK, Agarwal SP, Verma V, Rani P. A study of comparison between the efficacy of endoscopic septoplasty and traditional septoplasty. Int Surg J 2016;3:1134-40.