Endoscopic Septoplasty—Two Handed Technique with Endoscope Holder: A Novel Approach

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Abstract The popularity of endoscopes has been expanding not only in diagnostics but also in therapeutics. The traditional septal surgery also has come under the purview of endoscopic surgery in the last few decades. Endoscopic septoplasty has definitely many advantages over the conventional procedure. But the only disadvantage of endoscopic surgery is that it is a single handed technique as the other hand is used for holding the endoscope which may compromise the overall surgical time as the hemostasis and suctioning of the surgical field off the blood cannot be done simultaneously, in addition to the surgeon fatigue associated with holding the endoscope in the left hand. Endoscope holder allows both hands of the surgeon to be free for surgical manipulation and also imitates more or less same actions of the left hand. To report the preliminary use of Khan's endoscope holder for endoscopic septoplasty. Prospective Non Randomized Clinical Study. Khan's Endoscope Holder, which was primarily designed for endoscopic ear surgery, has been used for two handed technique of endoscopic septoplasty. The design of the Endoscope holder is described in detail. A total of 49 endoholder assisted endoscopic septoplasties were operated from Nov 2014 to Jan 2015 in MIMER Medical College and Sushrut ENT Hospital, Talegaon D, Pune, India. Our Endoscope Holder is a good option for two handed technique in Endoscopic Septoplasty due to its advantages. The

study reports the successful usage and applicability of the endo holder for endoscopic Septoplasty.

Level of evidence IV.

Keywords Endoscope holder · Endoscopic septoplasty

Introduction

Nasal obstruction is a very common complaint of patients presenting in Ear Nose Throat Out Patient Clinic. Septoplasty is the operative procedure for the correction of nasal obstruction caused by septal deviation. Septoplasty is done by the traditional head light approach. In this modern era of endoscopy, the Hopkin Rod Lens System has revolutionised the field of Otorhinolaryngology. The popularity of endoscopes has been expanding not only in diagnostics but also in therapeutics. In the last few decades, the traditional headlight approach septal surgery also has come under the arena of endoscopic surgery. Endoscopic septoplasty is a minimally invasive procedure allowing endoscopic guided removal of the deviated part of the nasal septum. Endoscopic septoplasty was described by Lanza et al. and Stammberger in [1, 2]. Endoscopic septoplasty has definitely many advantages over the conventional procedure. Many studies of endoscopic septoplasty have been mentioned in the literature [3–6]. The studies on endoscopic septoplasty mentioned in the literature are those of one handed technique with the endoscope being held in the non-dominant hand of the surgeon and the instruments in the dominant hand. This method of endoscopic surgery though preferred, but may compromise the overall surgical time as the hemostasis and suctioning of the surgical field off the blood cannot be done simultaneously, in addition to the fatigue associated with holding of

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the endoscope. We have been performing the two handed technique of endoscopic septoplasty with the help of Khan's Endoscope Holder [7], which was primarily designed as an modification of the Otomicroscope, but the uses of it are being extended and extrapolated to incorporate the Endoscope Holder into nasal surgeries. The concept, design and development of our Endoscope holder is published earlier [7]. The aim of this prospective non randomised clinical study is to report the preliminary use of our Endoscope Holder in two handed endoscopic septoplasty.

Methods and Materials

A total of 49 consecutive endoscopic septoplasties were operated with Khan's Endoscope Holder from November 2014 to January 2015 in M.I.M.E.R Medical College and Sushrut ENT Hospital for patient with symptomatic septal deviations with a follow up period ranging from 6 to 8 months. A complete ENT examination was done in all patients. Inclusion criteria were above 18 years of age, symptomatic septal deviation consistent with nasal obstruction at least for 3 months inspite of medical management (nasal steroid, antihistaminic and/or oral decongestants) (Figs. 1, 2). The patients with sinusitis, allergic rhinitis and those in need of nasal surgery other than septoplasty for nasal obstruction were excluded from the study. The patients ranged from 19 to 49 years of age with a mean age of 27.28 ± 4.86 years. Preoperatively, the

Fig. 1 Gross C shaped DNS

Fig. 2 Gross S shaped DNS

patients were asked to complete the Nose Obstruction Symptom Evaluation (NOSE) Questionnaire.

Nose Scale for Evaluation of Nasal Obstruction [8]

1. Nose obstruction and stuffiness.
2. Nose obstruction.
3. Trouble breathing through my nose.
4. Trouble sleeping.
5. Unable to get enough air through my nose during exercise or exertion.

Each of these were graded as

- 0: Not a problem.
- 1: Very mild problem.
- 2: Moderate problem.
- 3: Fairly bad problem.
- 4: Severe problem.

Design and Concept of Khan's Endoscope holder [7] (Patent Application No. 2313-Mum-2013)

Khan's Endoscope Holder is a metallic plate of $70 \times 40 \times 10$ mm in dimensions with a slot measuring 16×16 mm in diameter mounted on the Otomicroscope stand (Optofine Microscope, India) after removal of the microscope head fastened with 4 screws. The arms and the control knobs of the Otomicroscope are utilised for imparting additional actions so that the endoscope holder can be rotated in any direction (forwards, backwards,

Fig. 3 Khan's endoholder

Fig. 4 Innovative endoholder closure look

upwards, downwards and sidewise angular rotation) at any level convenient to the operator (Fig. 3).

Operating Theatre Requirements

Zero degree 4 mm endoscope with endoscopic Camera (Karl Storz, Germany) is placed onto multi action self-retaining rotatory endoscope holder (Fig. 4).

The septum is infiltrated with 2 percent lidocaine with 1 in 100,000 adrenaline (Astra company, India). All patients were operated under general anaesthesia.

Position of Endoscope Holder

The endoholder stand is placed on the left hand side of the patient with the endoscope directed towards the nose. The operating surgeon stands on the right hand side of the patient with the monitor facing the surgeon (Fig. 5).

Fig. 5 Endoholder in action

Fig. 6 Endoscopic incision, note the use of two hands

Procedure of Endoholder Assisted Endoscopic Septoplasty

Endoholder assisted endoscopic septoplasty was performed by both the authors (Figs. 6, 7, 8, 9). The operating steps are similar to the routine septoplasty (Hemitransfixion incision followed by elevation of mucoperichondrium and mucoperiosteum, and addressing of all areas of deviation with reshaping/removal). The only difference is that as it is

Fig. 7 Elevation of mucoperichondrium, note the use of two hands

Fig. 8 Excision of septal deviation, note the use of two hands

Fig. 9 Correction of ACD by cut and suture, note the use of two hands

endoholder assisted endoscopic septoplasty, there is endoscopic visualisation of each and every aspect of the surgical correction. The stability of the endoscopic image on the monitor is ensured throughout the procedure. The endoscope is mounted on the endoholder and hence both the hands of the surgeon are available for surgical manipulation thus obviating the only disadvantage of Endoscopic surgery. The suctioning and the surgical steps can be simultaneously done being a two handed advantage of endoscope holder.

Results

Twenty-seven endoscope holder assisted endoscopic septoplasties have been operated from November 2013 to January 2014 for symptomatic nasal septal deviations with follow up period ranging from 6 to 8 months. All patients completed the NOSE Questionnaire preoperatively and postoperatively. Also endoscopic recording of the all the pre and postoperative nasal endoscopies for anatomical septal deviation was done for documentation. As this is an innovative concept, this is a preliminary effort to demonstrate and report the use of our Endoscope holder for endoscopic septoplasty. No other procedure was combined along with septoplasty (Table 1).

Patients were operated on day care basis and followed up on second post-operative day for nasal pack removal. None of the patients developed bleeding in the immediate postoperative period. The patients experienced a significant improvement in nasal obstruction in the observed follow up period. Patients were also questioned about the ease of breathing pre and postoperatively.

The preoperative NOSE scale was 68.46 ± 11.27 and the postoperative NOSE scale was 11.82 ± 4.39 . The difference between the pre and postoperative nasal scores was statistically significant ($p < 0.001$).

Discussion

In this endoscopic era, the Hopkin Rod Lens System has encompassed almost all domains of surgeries. About few decades ago, endoscopic surgery was confined only to

Table 1 Age and gender of the endoscope holder assisted endoscopic septoplasty study group

Age groups (in years)	Number of patients		
	Male	Female	Total
18–30	5	6	11
31–40	7	2	09
41–50	5	2	07
Total	17	10	27

paranasal sinuses. But now, it is gradually pervading into septal surgeries due to its obvious advantages. The concept of endoscopic septoplasty is not a new one. First endoscopic surgery was reported in 1991 by Lanza and Stammberger [1, 2]. Endoscopic septoplasty reported in the literature is a single handed technique where the non-dominant hand is utilised for the holding the endoscope and the other for surgical instrumentation and manipulation. This effective compromise in the 2 handed technique of endoscopic surgery compelled the first author to develop an endoscope holder which would augment the applicability of the endoscope in all Otolaryngologic surgical domains. Khan's Endoscope Holder [7], primarily developed to facilitate two handed Endoscopic Ear Surgery, has been incorporated into nasal surgeries to define and extend the uses and applicability of the endoscope holder. The Endoholder assisted Endoscopic Septoplasty augments the documented advantages of the routine single handed Endoscopic surgery by imparting it the two handed technique.

The retrospective study by Chung et al. [6] of 116 patients of endoscopic septoplasty reported transient dental pain/hypermesthesia in 4.3 %, asymptomatic septal perforation in 3.4 %, synechia formation in 2.6 %, epistaxis 0.9 %, septal haematoma in 0.9 %, and persistent septal deviation requiring revision septoplasty in 0.9 % patients. Whereas, in the retrospective study by Hwang et al. [4] including 111 patients of endoscopic septoplasty, there were asymptomatic perforation in 0.9 %, haematoma in 0.9 % and synechia formation in 4.5 % patients. In our study of 27 endoholder assisted endoscopic septoplasty operated as Day Care Procedures, none of the patients developed postoperative complications.

Advantages of Endoholder Assisted Endoscopic Septoplasty

1. Endoscope offers the complete and thorough assessment of the nasal cavity, septal deviation and ostio meatal complex intraoperatively.
2. It effectively allows precise removal of the deviated part of the septum and spurs.
3. It minimizes the incidence of tear of mucoperichondrial septal flaps.
4. Endoscopic guidance helps in precise and accurate placement of instruments.
5. Two handed endoscopic surgery as both the hands of the surgeon are free for operative intervention which is of paramount importance both for diagnostic and operative procedure.
6. No surgeon fatigue associated with holding of the endoscope in the non -dominant hand.
7. The Endoholder can be used effectively without compromising the surgical field.

8. As endoscope is fixed onto the holder, the stability of the endoscope, camera and image on the monitor is ensured throughout.
9. Minimizes the need for assistance.
10. As the endoholder has been designed on the Oto-Microscopic Stand, the fine focus of the microscopic stand can be utilized for additional manipulation/advancing into the nasal cavity.
11. As the endoscope is mounted on the Endoscope Holder, all incisions are possible including Killian's, Freer's, spurectomy incisions without any discomfort to the surgeon or the assistant.
12. As the endoscope is mounted on the Endoscope Holder, the placement of septal quilting sutures can be done comfortably by two handed technique.
13. Success rate is higher due to the precision during every step of the surgery.
14. Helps in Preoperative diagnosis and post-operative surveillance.
15. As it is a double handed technique of endoscopic septoplasty, simultaneous use of operative instrument and suction is possible, keeping the surgical field clearer.
16. As it is double handed endoscopic surgery, it avoids the delay caused by single handed surgery. Hence quality and duration of the surgery is improved.
17. Endoscopic recording facility is useful for documentation and is an excellent teaching aid.

Limitations of the Study

Smaller study group with a short follow up period.

Conclusion

The Endoholder used for endoscopic septoplasty is developed as a modification of microscopic stand. It augments the applicability of the endoscope into ENT practice. With little practice, the use of endoscope holder can be extended routinely for most of Otorhinolaryngological surgeries. Endoscope holder is a valuable adjunct to conventional endoscopic surgeries due to its obvious advantages. The technique though useful has a different learning curve and training is useful to allow more familiarity when getting started.

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Compliance with Ethical Standards

Conflict of interest Application for patent in respect of "MULTI-ACTION SELF RETAINING ROTATORY ENDOSCOPIC HOLDER" bearing Application No.2313/MUM/2013 in the name of

Dr. Mubarak Khan to Patent controller of India. Dr Sapna Parab has helped in preparing the manuscript and evaluated endoscopic holder actively during various otolaryngological surgeries independently and along with first author.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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