



## CLINICAL STUDY

# A COMPARISON OF QUALITY OF LIFE AND OUTCOMES OF ENDOSCOPIC AND CONVENTIONAL SEPTOPLASTY

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### SUMMARY

**Objective:** Endoscopic septoplasty (ES) is a minimally invasive surgical technique for the nasal septal deviation. The purpose of this study was to compare the quality of life and outcomes of patients who underwent conventional septoplasty (CS) and ES without additional nasal surgeries.

**Methods:** A total of 36 patients were selected among patients who underwent CS, and 35 sex- and age-matched patients who underwent ES were enrolled in the study. Visual Analogue Scale (VAS) and Nasal Obstruction Symptom Evaluation (NOSE) scores were used to collect the patient's quality of life at the time of diagnosis and 3 months after CS and ES. The complication rates, duration of surgery and hospital stay were comparatively analyzed.

**Results:** Preoperative VAS and NOSE scores were not statistically different in both groups ( $p=0.731$ ,  $p=0.899$ ; respectively). The VAS and NOSE scores were significantly improved postoperatively ( $p_{CS-VAS}<0.001$ ,  $p_{ES-VAS}<0.001$ ;  $p_{CS-NOSE}<0.001$ ,  $p_{ES-NOSE}<0.001$ ; respectively); however, no significant difference was observed when the improvements of VAS and NOSE scores compared between CS and ES groups ( $p=0.307$ ,  $p=0.461$ ; respectively). Intraoperative flap laceration and intra/postoperative hemorrhage were in the favor of patients who underwent ES ( $p=0.031$ ,  $p=0.035$ ; respectively). However, duration of surgery and hospital stay were lower in ES group compared to CS group ( $p<0.001$ ,  $p=0.004$ ; respectively).

**Conclusion:** In selected cases, ES is a useful surgical technique in terms of complication rates, duration of surgery and hospital stay. Nevertheless, improvement of the quality of life was similar in patients underwent CS and ES.

**Keywords:** Endoscopic, conventional, septoplasty, quality of life, outcome

### ENDOSKOPİK VE KONVANSİYONEL SEPTOPLASTİNİN YAŞAM KALİTESİ ÜZERİNE ETKİLERİNİN VE SONUÇLARININ KARŞILAŞTIRILMASI

#### ÖZET

**Amaç:** Endoskopik septoplasti (ES), septal deviasyonun düzeltilmesinde tercih edilen minimal invaziv cerrahi tekniktir. Bu çalışmanın amacı ek bir nazal cerrahi olmaksızın ES ve konvansiyonel septoplasti (KS) uygulanan olgularda yaşam kalitesini ve sonuçlarını karşılaştırmaktır.

**Yöntemler:** Otuzaltı KS uygulanan hasta ve cinsiyet-yaş uyumlu 35 ES uygulanan hasta çalışmaya alındı. Hastaların yaşam kaliteleri; tanı anında ve cerrahilerden 3 ay sonra Vizüel Analog Skala (VAS) ve Burun Tıkanıklığı Semptom Değerlendirme (BTSD) skorları ile değerlendirildi. Komplikasyon oranları, cerrahi ve hastanede kalış süreleri de karşılaştırmalı olarak analiz edildi.

**Bulgular:** Preoperatif VAS ve BTSD skorlarının her iki grupta da farklı olmadığı izlendi ( $p=0.731$ ,  $p=0.899$ ). Postoperatif dönemde VAS ve BTSD skorlarının anlamlı derecede düzeldiği izlendi ( $p_{KS-VAS}<0.001$ ,  $p_{ES-VAS}<0.001$ ;  $p_{KS-NOSE}<0.001$ ,  $p_{ES-NOSE}<0.001$ ); ancak her iki cerrahi grup arasında VAS ve BTSD skorlarında iyileşme düzeyleri açısından anlamlı bir farklılık izlenmedi ( $p=0.307$ ,  $p=0.461$ ). İntraoperatif flep laserasyonu ve intra/postoperatif hemoraji ES uygulanan grupta daha az görüldü ( $p=0.031$ ,  $p=0.035$ ). Cerrahi ve hastanede kalış süreleri ES uygulanan grupta KS uygulanan gruba göre anlamlı derecede düşük gözlemlendi ( $p<0.001$ ,  $p=0.004$ ).

**Sonuç:** Seçilmiş olgularda ES'nin komplikasyon oranları, cerrahi ve hastanede kalış süreleri açısından üstün olduğu görülmektedir. Ancak hastaların yaşam kalitesindeki iyileşme açısından her iki cerrahi tekniğin birbirine üstünlüğü bulunmamaktadır.

**Anahtar Sözcükler:** Endoskopik, konvansiyonel, septoplasti, yaşam kalitesi, sonuç

## INTRODUCTION

The nasal septum is a key structure for nasal functions and stability. Therefore, the nasal septal deviation may lead to several complaints such as nasal obstruction, rhinogenic headache, chronic/recurrent rhinosinusitis and aesthetic deformities<sup>1,2</sup>. The nasal septal deviation is detected in 19% of newborns, 37% of children and 89% of adults<sup>3-5</sup>. Although a variety of factors may cause the

formation of the nasal septal deviations, most common reasons are trauma and microfractures during birth that are likely to cause asymmetry in the nasal septum of newborns or children<sup>6</sup>.

Currently, septoplasty is the recommended surgical method for the correction of nasal septal deviation. However, the septoplasty can be performed using two different techniques: conventional and endoscopic. In fact, significant improvements in the patient's quality of life have been demonstrated using both surgical techniques<sup>7</sup>. Despite numerous modifications, conventional

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septoplasty (CS) is principally performed under limited view using forehead light. On the other hand, endoscopic septoplasty (ES) performed using rigid Hopkins endoscopes which provide more magnified images. Although both techniques are routine clinical applications, they have different advantages and disadvantages. In CS, the major advantages are: (i) few instruments are required and (ii) caudal deviations (Cottle area I and II) can be corrected easily and successfully; however, the main drawbacks are (i) relatively high patient morbidity and (ii) complication rates<sup>8</sup>. In contrast, ES has many advantages such as (i) a minimally invasive surgical procedure using mini-flap dissection (incision can be performed posteriorly and posterior chondrotomy is not always required), (ii) better educational technique particularly for residents and (iii) surgical documentation<sup>8</sup>. However, mono-ocular view, experienced surgeon, difficult to approach to caudal septum, need for more surgical tools are the major limitations<sup>9</sup>. It is noteworthy that abovementioned advantages and disadvantages of both surgical techniques do not fully reflect the surgical outcomes; because they are usually evaluated in cases who underwent a combination nasal surgery such as rhinoplasty, turbinoplasty and/or endoscopic sinus surgery. Therefore, the purpose of this study was to determine and analyze the pre- and postoperative surgical outcomes and quality of life of patients who underwent CS and ES for the surgical correction of nasal septal deviation without other nasal surgeries.

## MATERIAL and METHODS

The patients who underwent CS and ES (except for rhinoplasty, and/or turbinate surgery and/or sinus surgery) between January 2012 and December 2017 were included in this study. The exclusion criteria are as follows: (i) patients under the age of 18, (ii) patients with vasomotor or allergic rhinitis, (iii) patients with acute or chronic rhinosinusitis, and (iv) patients with a history of previous nasal surgery.

The surgical technique of CS: After the hemitransfixion incision, deviated septal parts were excised with modern septoplasty technique. Excised cartilages were crushed and replaced into the nasal septum, and closed with 5/0 rapid vicryl hemitransfixion sutures. Intranasal silicone septal splints were used and stabilized using trans-septal splint suture. Intranasal splints were removed after 3 days.

The surgical technique of ES: A vertical incision was done approximately 2 mm before septal deviation (limited deviation located on Cottle area III, IV and V) under a 0° rigid endoscopic view. Deviated septal portion was excised thereafter. Upon correction of the deviated parts, cartilaginous grafts were crushed and replaced into the nasal septum. The flap was closed with 5/0 rapid vicryl trans-septal sutures. Nasal packing was not applied to patients who underwent ES.

Both groups had antibiotherapy (Amoxicillin Clavulanate 1000 mg, 2x1 [Croxilex BID; İbrahim Etem Ulagay, Istanbul, Turkey]), analgesics (Paracetamol 500 mg, 3x1 [Tamol; Sandoz, Istanbul Turkey]), and nasal douching (Bruno; Abdi İbrahim, Istanbul, Turkey) for one week postoperatively.

Subjective assessments of nasal obstruction symptoms and disease-specific quality of life were evaluated with the validated Nasal Obstruction Symptom Evaluation (NOSE) Scale and Visual Analogue Scale (VAS) before and 3 months after surgery. Nasal Obstruction Symptom Evaluation is a disease-specific quality of life questionnaire for nasal obstruction<sup>10,11</sup>. This questionnaire consists of 5 questions: (i) nasal congestion and stuffiness, (ii) nasal blockage or obstruction, (iii) trouble breathing through nose, (iv) trouble sleeping, (v) unable to get air through the nose during exercise. The patient answers each question with scores ranging from 0 to 4 according to the severity of her/his situation. Visual Analogue Scale was ranged from 0 (worst) and 10 (best), was assessed the patients' global of quality of life. In addition, duration of surgery and hospital stay, and complications such as intraoperative flap laceration, intra-postoperative hemorrhage, synechiae, septal perforation, persistent deviation were evaluated.

Statistical analyses were performed using SPSS v19.0 software for Mac (SPSS, Inc., Chicago, IL, USA). Chi-square and Fisher's Exact Test was used to compare the complications between two groups. Parametric values were analyzed using the independent samples t-test and the non-parametric values for Wilcoxon test. Spearman's correlation test was used to analyze the correlations between two variables. A value of  $p < 0.05$  was considered statistically significant.

Informed written consent was obtained from enrolled subjects and this study was approved by Ethics Committee of Health Sciences.

## RESULTS

Thirty-six patients (16 female, 20 male) who underwent CS and 35 patients (13 female, 22 male) who underwent ES were found to meet the study criteria. There were no significant differences among gender and age (Age<sub>CS</sub>: 34.5 ±11.45; Age<sub>ES</sub>: 29.9±13.35 ;  $p=0.127$ ) situations between two groups (Table 1). In addition, preoperative VAS and NOSE scores were not statistically significant between patients who underwent CS (VAS<sub>CS</sub>: 2.2±0.76 and NOSE<sub>CS</sub>: 12.5±1.98) and ES (VAS<sub>ES</sub>: 2.3±0.79,  $p=0.731$  and NOSE<sub>ES</sub>: 12.6±2.7,  $p=0.899$ ).

The scores of VAS ( $p_{CS}<0.001$ ;  $p_{ES}<0.001$ ) and NOSE ( $p_{CS}<0.001$  ;  $p_{ES}<0.001$ ) were significantly improved in the postoperative period in both groups. Moreover, all scores of NOSE were significantly decreased in both groups (Table 2). The comparative analysis between patients with CS and ES did not show a statistically significant difference according to the scores of VAS (VAS<sub>CS.Preop-Postop.</sub> : -6 ± 0.97 and VAS<sub>ES.Preop-Postop.</sub> : -5.7 ±1.34;  $p=0.307$ ) and NOSE (NOSE<sub>CS.Preop-Postop.</sub> : 8.6 ± 2.34 and NOSE<sub>ES.Preop-Postop.</sub> : 8.1 ±2.35;  $p=0.461$ ).

Endoscopic septoplasty was performed with a significantly shorter surgical time (Duration of surgery<sub>CS</sub>: 35.2 ± 4.97 min. and duration of surgery<sub>ES</sub>: 29.2 ± 2.92 min.;  $p<0.001$ ). Moreover, the patients who underwent CS stayed longer than patients who underwent ES (Duration of hospital stay<sub>CS</sub>: 21.4 ±

9.34 hour and duration of hospital stay<sub>ES</sub>: 15.1 ± 8.93 hour;  $p=0.004$ ). No major complications were observed such as loss of vision, cerebrospinal fluid leaks, and loss of smell in both groups. Minor complications such as intraoperative flap laceration (CS: 14/36, ES: 5/35;  $p=0.031$ ) and intra/postoperative hemorrhage (CS: 11/36, ES: 3/35;  $p=0.035$ ) were observed more in CS group compared to ES group. There was no difference for persistent deviation (CS: 7/36, ES: 2/35;  $p=0.151$ ), synechiae (CS: 2/36, ES: 1/35;  $p=1$ ) and septal perforation (CS: 2/36, ES: 1/35;  $p=1$ ) between two groups. The septal perforations were smaller than 2 mm. Positive correlation was found between surgery time and hospital stay ( $\rho=0.444$ ;  $p<0.001$ ). In CS group, a positive correlation between flap laceration and surgery time ( $\rho=0.542$ ;  $p=0.001$ ), hemorrhage and duration of surgery ( $\rho=0.734$ ;  $p<0.001$ ) were detected. Similarly, duration of surgery and flap laceration ( $\rho=0.558$ ;  $p=0.001$ ), and duration of surgery and hemorrhage ( $\rho=0.473$ ,  $p=0.004$ ) were found in ES group. On the other hand, in both of CS and ES groups; no correlation was determined between hospital stay and complications.

**Table 1.** The comparison of patient characteristics, pre- and post-operative VAS and NOSE scores, duration of surgery and hospital stay, and complications between conventional and endoscopic septoplasty.

	Conventional Septoplasty	Endoscopic Septoplasty	<i>p</i>	
n (Female/Male)	36 (16F/20M)	35 (13F/22M)	0.531	
Age (years)	34.5 ± 11.45	29.9 ± 13.35	0.127	
VAS	Preoperative	2.2 ± 0.76	2.3 ± 0.79	0.731
	Postoperative	8.3 ± 0.87	8 ± 0.79	0.266
NOSE Scale Score	Preoperative	12.5 ± 1.98	12.6 ± 2.7	0.899
	Postoperative	3.9 ± 2.06	4.4 ± 1.8	0.296
Improvement of VAS	-6 ± 0.97	-5.7 ± 1.34	0.307	
Improvement of NOSE Scale	8.6 ± 2.34	8.1 ± 2.35	0.461	



	Duration of Surgery (minute)	35.2 ± 4.97	29.2 ± 2.92	<0.001*
	Duration of Hospital Stay (hour)	21.4 ± 9.34	15.1 ± 8.93	0.004*
	Flap Laceration	14/36	5/35	0.031*
	Hemorrhage	11/36	3/35	0.035*
Complication	Persistent Deviation	7/36	2/35	0.151
	Synechiae	2/36	1/35	1
	Perforation	2/36	1/35	1

F: Female, M: Male, VAS: Visual Analogue Scale, NOSE: Nasal Obstruction Symptom Evaluation.

**Table 2.** The scores on VAS and NOSE scales at preoperative and 3 months after surgery in both groups.

		Conventional Septoplasty	<i>p</i>	Endoscopic Septoplasty	<i>p</i>
VAS	Preoperative	2.2 ± 0.76	<0.001*	2.3 ± 0.79	<0.001*
	Postoperative	8.3 ± 0.87		8 ± 0.79	
Q.1	Preoperative	3.3 ± 0.51	<0.001*	3.6 ± 0.66	<0.001*
	Postoperative	1.1 ± 0.58		1.3 ± 0.77	
Q.2	Preoperative	3.5 ± 0.51	<0.001*	3.4 ± 0.66	<0.001*
	Postoperative	0.8 ± 0.61		0.9 ± 0.55	
Q.3	Preoperative	3.3 ± 0.57	<0.001*	3.4 ± 0.69	<0.001*
	Postoperative	0.8 ± 0.66		1 ± 0.71	
Q.4	Preoperative	1.8 ± 1.38	<0.001*	1.6 ± 0.98	<0.001*
	Postoperative	1.1 ± 1.07		0.9 ± 0.69	
Q.5	Preoperative	0.7 ± 1.01	0.001*	0.6 ± 0.94	0.023*
	Postoperative	0.2 ± 0.38		0.3 ± 0.48	
NOSE Scores	Preoperative	12.5 ± 1.98	<0.001*	12.6 ± 2.7	<0.001*
	Postoperative	3.9 ± 2.06		4.4 ± 1.8	

VAS: Visual Analogue Scale, NOSE: Nasal Obstruction Symptom Evaluation, Q: Question.

## DISCUSSION

The deviation of the nasal septum, is a common clinical entity in population, and may lead to a remarkable decrease in quality of life. Although surgical advancements in septoplasty (radical septoplasty, submucous resection and modern septoplasty; respectively) has been observed since last century, there is still no consensus in the literature for the "ideal" procedure<sup>9</sup>. Brennan et al.<sup>8</sup>

stated that ideal septoplasty procedure should correct the deviation without any complication. Therefore, ES with less morbidity and complication has become popular with the use of rigid endoscopes in the nasal cavity. In literature, there were several comparative studies of CS and ES with additional nasal surgeries such as rhinoplasty, turbinate surgery or sinus surgery. In the present study, only two techniques were evaluated without additional nasal surgeries;



thereby a more objective comparison of both surgical techniques was performed.

In literature, Paradis and Rotenberg<sup>7</sup> found that both CS and ES showed significant improvement in the NOSE score after septoplasty and there was no superiority between both techniques according to the NOSE scale. In the present study, similar outcomes were obtained, NOSE and global quality of life scores (VAS scores) significantly improved postoperatively. Additionally, both septoplasty techniques were not superior to each other according to NOSE and VAS. In literature, severity of symptoms which was not assessed by standard scale was reduced and both surgical procedures were not superior to each other<sup>8,12-14</sup>. In present study and literature, there was no difference between two techniques in terms of improvement in quality of life. This situation may be related with the absence of serious or major complications such as persistent deviation, synechia or septal perforation that influenced the patient's quality of life in long term.

In literature, the description of an ideal ES is still not possible yet. Moreover, no consensus has been reached as to which side (convex or concave side) of the incision should be made. Castelnuovo et al.<sup>15</sup> made incisions from the convex side of septal deviation and Hwang et al.<sup>16</sup> preferred concave side incision. In the present study, convex side incision was performed. There was no statistically significant difference in synechia and perforation development with choosing incision side when compared literature and present study. On the other hand, incidence of synechia was a little bit more in the studies of Hwang et al. and us compared to Castelnuovo et al. The cause of slightest difference may be the usage of nasal packing in the study of Castelnuovo et al. Although there is no relation between development of synechia and perforation and incision side, if unilateral endoscopic sinus surgery is planned, making the septal incision from the other side may reduce the risk of synechia development<sup>8</sup>.

The incidence of some complications in the ES group was significantly lower in agreement with the literature. Intra-postoperative hemorrhage rates were noted statistically more frequent in CS group. Similarly, Sathyaki et al.<sup>14</sup> reported that hemorrhage was more common in cases who underwent CS. The probable cause of this is that more brutal manipulations such as excision of inferior bone deviation in CS. In present study, intraoperative mucosal flap laceration incidence was statistically less common in ES group compared to CS group. In a systematic review by Hong et al.<sup>17</sup>, the risk for developing flap laceration in CS patients was 1.8

times (RR: 1.84 [%95 CI, 1.27-2.68],  $p=0.001$ ) greater than the patients who underwent ES. The most likely cause of this difference was due to superb visualization of surgical area with increased magnification by endoscopic system and uncomplicated deviations were also in the ES group. ES was also associated with a significantly less persistent septum deviation rates (RR: 2.09 [%95 CI, 1.44-3.04],  $p<0.001$ ) compared to CS in a meta-analysis<sup>17</sup>. On the other hand, the persistent deviation was not different between the two groups in present study and also in a few literatures<sup>8,12,14</sup>. Hence there is no consensus on this issue, one of the possible causes may be a learning curve for ES or may be severe deviations in patients who underwent CS.

In the literature, the duration of ES was relatively short compared to the conventional methods<sup>7,18</sup>. The results of recent study were similar to abovementioned studies for the duration of surgery. Besides, in patients who need endoscopic sinus surgery with septoplasty procedure, if CS is preferred, only an additional period of 10 minutes is required for transition of head-light and endoscope<sup>8</sup>. The prolongation of surgical time in CS group should not be explained by only the severity of septal deviations. Because intraoperative complication rates and surgery time had a significant positive correlation in both group. The duration of hospital stay in patients who were treated with ES was significantly lower than that of CS group in the present study. Bothra et al.<sup>8</sup> showed that shorter recovery time was found in ES group and the result was similar to our findings. One of the possible causes may be a prolonged surgery time, because positive correlation was found between surgery time and hospital stay in present study. Ultimately, abovementioned results showed that ES is a cost-effective surgical procedure compared to CS in mid-term and long-term.

## CONCLUSION

Endoscopic septoplasty has some advantages such as lower complication incidence, less surgery time and hospital stay, cost-effectiveness than CS for patients, surgeons, residents and health system. In appropriate cases, meticulous surgical technique and experienced surgeon may provide excellent results without morbidities associated with conventional septoplasty approaches.

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