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Original Article

Comparative Study between Transnasal Endoscopic Sphenopalatine Artery Ligation and Cauterization in Posterior Epistaxis

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ABSTRACT

Background: Epistaxis is the commonest otorhinolaryngological emergency. Anterior epistaxis usually responds to conservative treatment. But, treatment of posterior epistaxis is challenging.

Aim of the work: The current study aimed to compare between transnasal endoscopic sphenopalatine artery ligation [TESPAL] and cauterization for control of posterior epistaxis.

Patients and Methods: Fourty patients with posterior epistaxis were included. They were randomly classified into two equal groups. The first [group A] for treatment by transnasal endoscopic sphenopalatine artery ligation. The second [group B] for treatment by transnasal endoscopic sphenopalatine artery cauterization. They were evaluated by history taking, clinical examination and routine laboratory investigations. After surgery, routine follow up consisted of anterior rhinoscopy and endoscopic nasal examination weekly during the first month then monthly up to 6 months. Postoperative complications such as recurrent epistaxis, nasal crustation, synechia, sinusitis and paresthesia in soft palate or nose were recorded.

Results: Both groups were comparable regarding patient age, gender [with overall male gender predominance] and associated complications. The majority of epistaxis was from the right side, and only one patient [5%] in each group presented by bilateral epistaxis. The majority were of idiopathic etiology. The majority of operation approached two branches of SPA [60% vs 65% of ligation and cauterization groups respectively]. The duration of surgery was shorter in ligation than cauterization [58.0±14.4 vs 61.5±13.9 minutes respectively]. However, the difference was statistically non-significant. Hospital stay duration also was comparable between both groups. The success rate was 85.0% and 80.0% in ligation and cauterization groups respectively and no significant difference was observed. Nasal crustation was significantly associated with cauterization [30.0%] than ligation [5.0%].

Conclusion: Although both ligation and cauterization were comparable as overall results. Ligation is superior in overall success rate and significantly associated with low crustation. This favors SPA ligation than cauterization. However, future studies are warranted.

Keywords: Epistaxis; Sphenopalatine Artery; Ligation; Cauterization.

INTRODUCTION

The lifetime incidence of epistaxis is about 60% and it is the most common otolaryngology emergency. Epistaxis most commonly occurs within a bimodal age distribution, primarily affecting individuals aged 2 to 10 years and aged 50 to 80 years. Peak incidence occurs among those aged 70 years and older [1]. In addition to digital trauma, nasal septum deviation, neoplasms and chemical irritants, systemic factors such as coagulopathies, kidney failure, alcoholism and vascular anomalies can also be a cause of epistaxis [2]. Seasonal changes, allergic rhinitis, exogenous or endogenous estrogens, environmental humidity, and upper respiratory tract infections increase its incidence [3,4].

While most patients are successfully treated in an outpatient setting by non-operative interventions such as nasal cautery or nasal packing, refractory epistaxis may require hospital admission and can be associated with significant morbidity and even mortality. It has been reported that 5% to 15% of patients requiring admission for epistaxis will require surgical management. As a result of high failure rate of nasal packing in posterior epistaxis [26%-52%], surgical intervention is more likely in the management of posterior epistaxis constituting 10% of all cases of epistaxis [5].

Although posterior nasal packing can be applied in patients with posterior epistaxis, both the morbidity and duration of hospitalization of these patients have been reduced through the transnasal endoscopic sphenopalatine artery ligation [TESPAL] and cauterization in recent years [6]. Treatment options for posterior epistaxis that is unresponsive to conventional nasal packing include surgical arterial ligation, cauterization or radiologic arterial embolization. The usage of endoscopic nasal surgery over the last 2 decades has led to major shifts in surgical approaches to epistaxis, away from traditional approaches to the external carotid or internal maxillary artery and toward endoscopic approaches to the sphenopalatine artery [5]. Endoscopic endonasal ligation of the sphenopalatine artery [SPA] was described by in 1992 than it has gained in popularity, affording high success rate for control of epistaxis with low risk of major adverse outcomes [7].

THE AIM OF THE WORK

The aim of this study was to compare between transnasal endoscopic sphenopalatine artery ligation [TESPAL] and cauterization for control of posterior epistaxis, estimate failure rate and complications.

PATIENTS AND METHODS

This study was conducted on forty patients with posterior epistaxis. They were divided into two groups the first one [Group A] 20 patients: treated by transnasal endoscopic sphenopalatine artery ligation and the second one [Group B] 20 patients: treated by transnasal endoscopic sphenopalatine artery cauterization. They were presented to emergency and ENT department of Al-Azhar University Hospital [New Damietta] between August 2017 and December 2020. The choice between the two surgical techniques has been blindly randomized and all patients were operated by the same doctor.

Approval from the ethics committee in Al-Azhar University and written informed consent by the patients was obtained for the study.

Inclusion criteria

- Patients with posterior epistaxis that could not be controlled with anterior and/or posterior nasal packing.
- Patients with recurrent posterior epistaxis.

Preoperative Clinical Evaluation: All patients were adequately resuscitated and must be hemodynamically stable. All patients were submitted to full history taking, general and otorhinolaryngological examination. Laboratory investigations included complete blood picture, coagulation profile, liver and kidney function tests. Patients with bleeding diathesis were consulted with the hematology expert.

Surgical technique: Patients were divided randomly [closed envelop method] into two groups: group-A treated by transnasal endoscopic sphenopalatine artery ligation while group-B treated by transnasal endoscopic sphenopalatine artery cauterization. General endotracheal anesthesia was used for all cases with the patient in a supine position. Cuffed endotracheal tube and oral pack used to avoid aspiration of blood. With a 0° or 30° rigid endoscope the nasal cavity is examined. Suction of blood clots and administration of topical vasoconstrictors to identify the sites of bleeding. The middle turbinate was gently medialized or trimmed with a true-cut forceps to provide access to the posterior middle meatus. Sometimes it is necessary to carry out a septoplasty previously, in cases when septal deviation prevents adequate access. Cottonoids soaked with 0.05% oxymetazoline or a similar vasoconstrictive agent applied to the middle meatus may improve visualization of the surgical field. Approximately 1-2mL of 1%lidocaine with1:100,000 epinephrine is injected into the submucosa of the posterior lateral wall of the middle meatus to be able to easily dissect the mucoperiosteal flap. An incision in the form of an ‘‘L’’ is made in the mucosa of the lateral nasal wall, 1 cm anterior to the insertion of the middle turbinate, continuing through the insertion of the inferior turbinate.

A preceding ipsilateral uncinectomy and maxillary antrostomy may be performed to facilitate identification of the posterior wall of the maxillary antrum, although this is not always necessary. If a maxillary antrostomy is performed, the posterior wall of the maxillary antrum may serve as the anterior boundary for dissection toward the sphenopalatine foramen. From either the mucosal incision created in the posterior middle meatus or the mucosal edge of the posterior maxillary ostia, a subperiosteal flap is widely elevated off the lateral nasal wall with a suction

freer in a subperiosteal plane. Flap elevation is continued in the anterior to posterior direction broadly to identify the crista ethmoidalis and then the sphenopalatine foramen with its accompanying neurovascular bundle.

Visualization of the sphenopalatine foramen may be improved by removing the crista ethmoidalis and anterior lip of the sphenopalatine foramen with a Kerrison forceps or an angled curette. The sphenopalatine artery and its distal arterial branches are then gently dissected with a ball-tip probe to provide 360° of access around the vessels. After adequate skeletonization of the sphenopalatine artery and its associated distal branches, the sphenopalatine artery can be ligated with hemostatic clips in [group A] or cauterized with bipolar electro-cautery in [group B].

After ligation or cauterization of the sphenopalatine artery through cut forceps used to cut the sphenopalatine artery and its associated branches distal to clipping or cautery. The elevated mucosa over the palatine bone can be repositioned over the palatine bone, followed by placement of hemostatic agents such as "Surgicel" to complete the procedure. There was no need for nasal packing, but in cases with septoplasty or middle turbinate trimming post-operative pack can be applied. The patient can be discharged after 24 to 48 hours after surgery.

All operative details such as side of surgery, associated septoplasty or middle turbinate trimming, post-operative pack and approached branches of spheno-palatine artery were recorded to compare between both groups. The duration of surgery and hospitalization recorded to compare between both groups. Cases with postoperative recurrent epistaxis were considered failure while cases with no post-operative recurrent epistaxis were considered success.

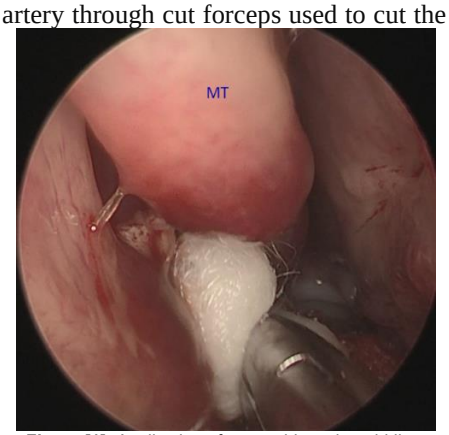


Figure [1]: Application of cottonoids to the middle meatus

Figure [2]: Injection in the submucosa of lateral wall

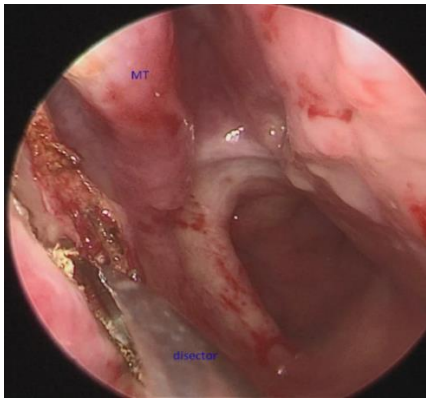


Figure [3]: Incision in the mucosa of the lateral nasal wall

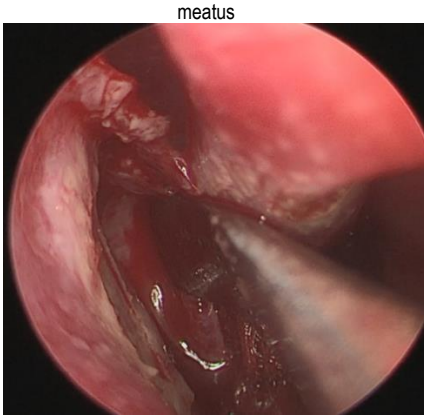


Figure [4]: Elevation of flap with a suction freer

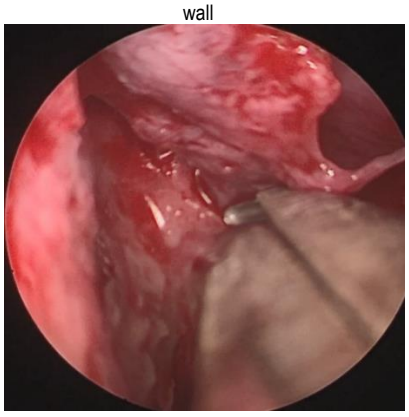


Figure [5]: Removal of crista by Kerrison forceps

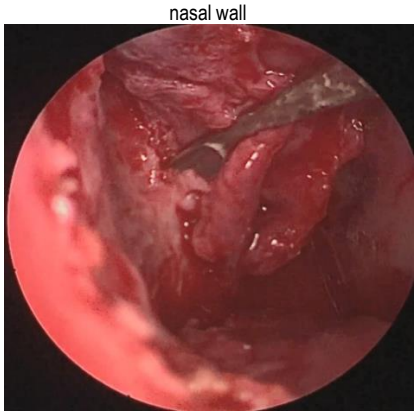


Figure [6]: Removal of crista by angled curette

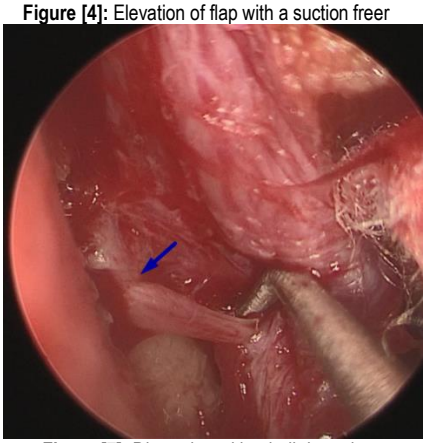
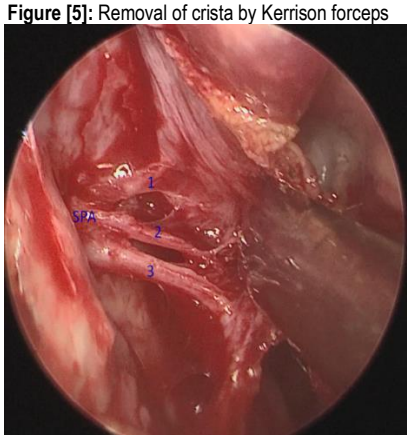
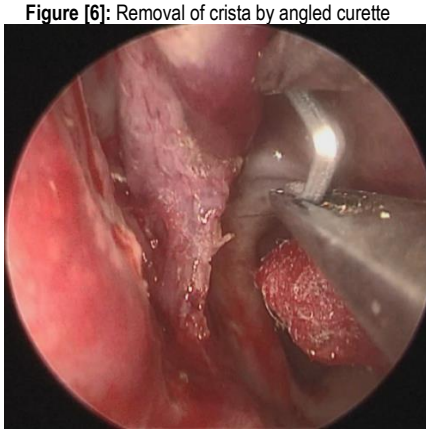


Figure [7]: Dissection with a ball-tip probe



Figure[8]: Skeletonization of SPA reveal 3 branches



Figure[9]:ligaclip applicator

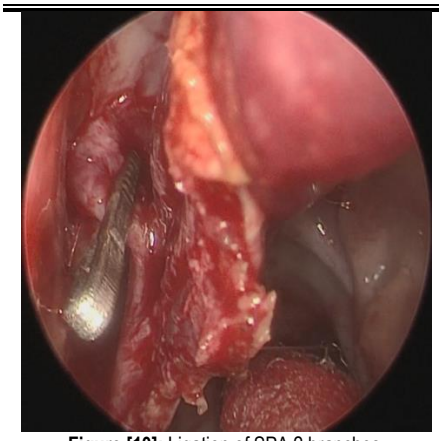


Figure [10]: Ligation of SPA 2 branches

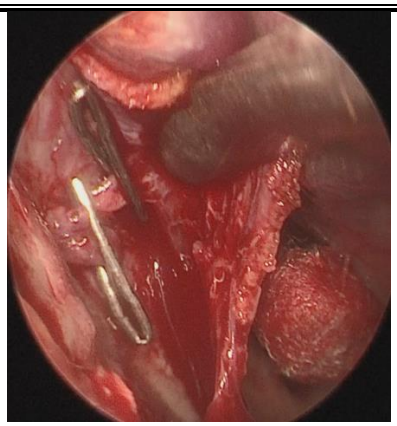


Figure [11]: Ligation of the third branch

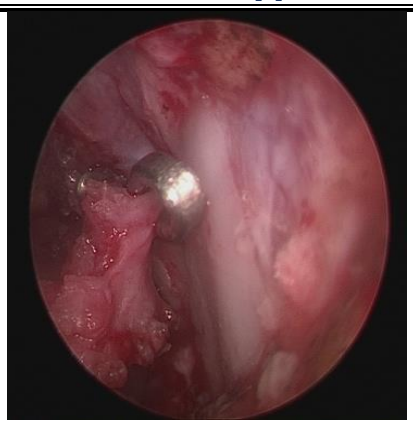


Figure [12]: Ligation of SPA 2 branches

Figure [13]: Ligation of SPA main trunk

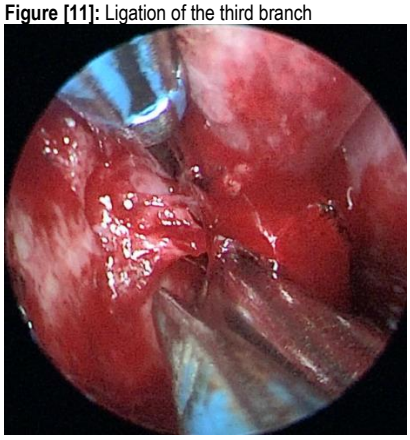


Figure [14]: Cauterization of SPA main trunk

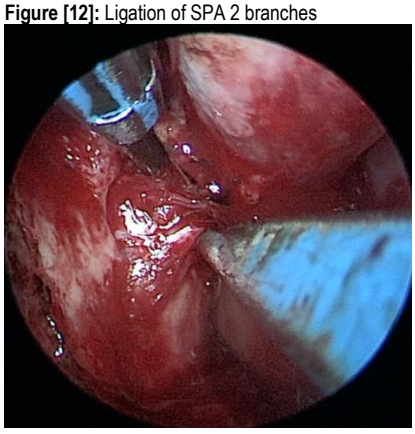


Figure [15]: Cauterization of SPA main trunk

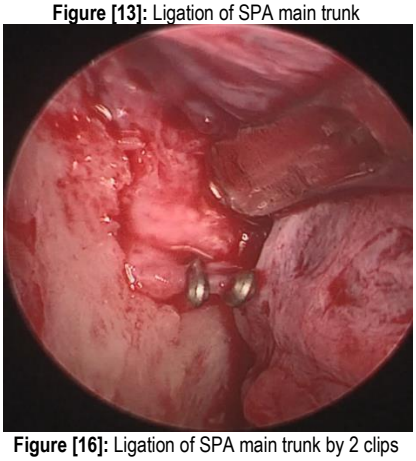


Figure [16]: Ligation of SPA main trunk by 2 clips

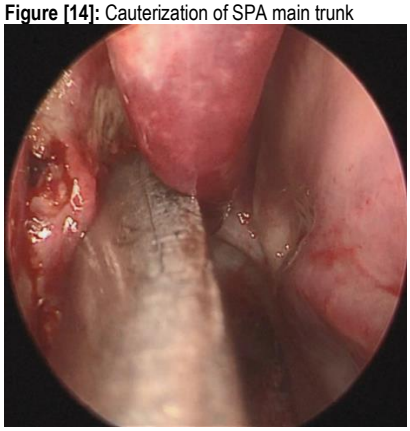


Figure [17]: Flap reposition over the palatine bone

Postoperative care: After surgery routine follow up consisted of anterior rhinoscopy and endoscopic nasal examination weekly during the first month then monthly up to 6 months. Topical vasoconstriction nasal drops and systemic antibiotic was prescribed to the patients to prevent rhino sinusitis and possibly toxic shock syndrome especially in patients with post-operative pack. Avoidance of aspirin and other non-steroidal anti-inflammatory drugs was advised. The patients were advised to maintain good nasal hygiene with nasal saline sprays and saline irrigations especially in the first 2 weeks after surgery to decrease postoperative crustations and synechia.

Postoperative complications: Periodic follow up of the patients was done to detect and manage postoperative complications such as recurrent epistaxis, nasal crustation, synechia, sinusitis and paresthesia in soft palate or nose. All postoperative complications were recorded to compare between both groups.

Recording and analysis of the data

Recording of the data: The data were recorded in special sheets and files including preoperative clinical and endoscopic evaluation; anesthesia; surgical technique; the operative findings; postoperative clinical and endoscopic evaluation, and complication.

Statistical analysis of data: The collected data organized, tabulated and statistically analyzed using statistical Package for Social Science [SPSS] software package [SPSS Inc, USA] version 16, running on IBM compatible computer with Microsoft® Windows 7 operating system and Office 2010. For quantitative data, frequency and percent distribution were calculated and for comparison between both groups, Chi square [X2] was

calculated. For quantitative data, mean and standard deviation [SD] were calculated and for comparison between both groups, the independent samples student's [t] test was used. For interpretation of results, p value ≤ 0.05 was considered significant.

RESULTS

In the present study, the mean age of the patients was 49.4 ± 10.5 years in ligation group and 50.8 ± 12.2 years in cauterization group with no statistically significant difference [p-value > 0.05] between studied groups as regard age. The gender of the patients was 70% males and 30% females in ligation group versus 75% males and 25% females in cauterization group with no statistically significant difference [p-value > 0.05] between studied groups as regard gender. There was no statistically significant difference [p-value > 0.05] between studied groups as regard preoperative co-morbidities. It was hypertension [45 %in ligation group vs. 40% in cauterization group], diabetes mellitus [15% in ligation group vs. 20% in cauterization group], use of anti-aggregates [45% in ligation group vs. 35% in cauterization group] and use of anti-coagulants [15% in ligation group vs. 10% in cauterization group].

Table [2] revealed that, the side of epistaxis was noticed more in the right side [60% in ligation group vs. 55% in cauterization group] than in the left side [35% in ligation group vs. 40% in cauterization group] and bilateral in [5% in both groups] with no statistically significant difference between studied groups as regard side of epistaxis. The etiology of epistaxis was undefined [45 %in ligation group vs. 40% in cauterization group], hypertensive peak [15% in ligation group vs. 20% in cauterization group], nose surgery [45% in ligation group vs. 35% in cauterization group] and trauma [15% in ligation group vs. 10% in cauterization group] with no statistically significant difference [p-value > 0.05] between studied groups.

Table [3] revealed that, the side of surgery was noticed more in the right side [60% in ligation group vs. 55% in cauterization group] than in the left side [35% in ligation group vs. 40% in cauterization group] and bilateral in [5% in both groups] with no statistically significant difference between studied groups as regard side of surgery. Approached arteries during surgery was SPA 1 branch [30% in ligation group vs. 20% in cauterization group], SPA 2 branch [60% in ligation group vs. 65% in cauterization group] and SPA >2 branches [10% in ligation group vs. 15% in cauterization group] with no statistically significant difference between studied groups.

Table [4] revealed that, no statistically significant difference between studied groups as regard duration of surgery [mean duration 58 ± 14.4 minutes in ligation group vs. 61.5 ± 13.9 minutes in cauterization group] and hospitalization [mean duration 2.7 ± 0.5 days in ligation group vs. 2.6 ± 0.5 days in cauterization group].

Table [5] revealed that, success rate was 85% in ligation group and 80% in cauterization group with no statistically significant difference between studied groups as regard results of surgery. The failure rate was 15% in ligation group and 20% in cauterization group which can be classified to early recurrent epistaxis<2weeks [66.7% in ligation group vs. 75% in cauterization group] and late recurrent epistaxis>2weeks [33.3% in ligation group vs. 25% in cauterization group].

Table [6] revealed that, minor complications noticed in some patients such as: nasal crustation [5% in ligation group vs. 30% in cauterization group], synechia [0% in ligation group vs. 15% in cauterization group], sinusitis [5% in ligation group vs. 15% in cauterization group] and paresthesia of nose or soft palate [0% in ligation group vs. 10% in cauterization group]. No statistically significant difference between studied groups as regard post-operative complications except for nasal crustation, it was more in cauterization group [30%]. No major complications noticed in any patients such as: mortality, necrosis of inferior turbinate or septal perforation.

Recurrent epistaxis: Recurrent epistaxis occurred in 3 cases [15%] in ligation group and 4 cases [20%] in cauterization group which is considered failure of procedure to control epistaxis. It can be classified in to Early [postoperative period <2weeks] and Late [Bleeding after 2 weeks]. Cases with recurrent epistaxis required further surgical intervention to control epistaxis. The patient was examined under general anesthesia a review procedure was performed and the remaining terminal branches of the artery either clipped or cauterized.

Nasal crustation: Nasal crustation occurred in 1 case [5%] in ligation group and 6 cases [30%] in cauterization group. The patients were advised to maintain good nasal hygiene with nasal saline sprays and saline irrigations especially in the first 2 weeks after surgery to decrease postoperative crustations.

Synechia: Synechia occurred in 0 case [0%] in ligation group and 3 cases [15%] in cauterization group. It can be managed by separation of synechia followed by insertion of Silastic Splints to prevent reformation.

Sinusitis: Sinusitis occurred in 1 case [5%] in ligation group and 3 cases [15%] in cauterization group. It can be managed by proper antibiotics and patients were instructed to clean the nose by alkaline nasal douche several times daily.

Paresthesia in soft palate or nose: Paresthesia in soft palate or nose occurred in 0 case [0%] in ligation group and 2 cases [10%] in cauterization group presumably because of injury to the greater palatine nerve as it enters its canal just lateral to the sphenopalatine foramen.

Table [1]: Comparison between studied groups as regard patient demographics and associated comorbidities.

		Ligation [N = 20]	Cauterization [N = 20]	Stat. test	P-value
Age [years]	Mea ±SD; range	49.4 ± 10.5; 25-65	50.8 ± 12.2; 22-67	0.4	0.688
Gender	Male	14 [70.0%]	15 [75.0%]	0.12	0.723
	Female	6 [30.0%]	5 [25.0%]		
Associated Comorbidities	Hypertension	9[45.0%]	8[40.0%]	0.1	0.749
	Diabetes mellitus	3[15.0%]	4[20.0%]	0.17	0.677
	Chronic liver disease	2[10.0%]	1[5.0%]	0.36	0.548
	Chronic kidney disease	0[0.0%]	1[5.0%]	1.02	0.311
	Heart disease	1[5.0%]	2[10.0%]	0.36	0.548
	Use of anti-aggregates	9[45.0%]	7[35.0%]	0.41	0.518
	Use of anti-coagulants	3[15.0%]	2[10.0%]	0.22	0.632

Table [2]: Comparison between studied groups as regard features of epistaxis.

		Ligation [N = 20]		Cauterization [N = 20]		test	P-value
Side	**Right**	12	60%	11	55%	0.11	0.946
	Left	7	35%	8	40%		
	Bilateral	1	5%	1	5%		
Etiology	**Undefined**	16	80%	17	85%	4.03	0.258
	Hypertensive peak	3	15%	1	5%		
	Nose surgery	0	0%	2	10%		
	Trauma	1	5%	0	0%		

Table [3]: Comparison between studied groups as regard operative details.

		Ligation [N = 20]		Cauterization [N = 20]		X^2	P-value
Side of surgery	**Right**	12	60%	11	55%	0.11	0.946
	Left	7	35%	8	40%		
	Bilateral	1	5%	1	5%		
Septoplasty		4	20%	3	15%	0.17	0.677
Middle turbinate trimming		3	15%	5	25%	0.62	0.429
Post-operative pack		5	25%	4	20%	0.14	0.705
Approached arteries	**SPA 1 branch**	6	30%	4	20%	0.17	0.677
	SPA 2 branch	12	60%	13	65%		
	SPA >2 branches	2	10%	3	15%		

Table [4]: Comparison between studied groups as regard duration of surgery and hospitalization.

		Ligation [N = 20]	Cauterization [N = 20]	test	P-value
Surgery [min]	Mean ±SD	58 ± 14.4	61.5 ± 13.9	0.76	0.447
	Min - Max	40 - 90	40 - 90		
Hospitalization [days]	Mean ±SD	2.7 ± 0.5	2.6 ± 0.5	0.65	0.520
	Min - Max	2 - 3	2 - 3		

Table [5]: Comparison between studied groups as regard results of surgery.

		Ligation		Cauterization		X^2	P-value
Results	Success	17	85%	16	80%	0.17	0.677 NS
	Failure	3	15%	4	20%		
	Early [<2weeks]	2	66.7%	3	75%		
	Late [>2weeks]	1	33.3%	1	25%		

Table [6]: Comparison between studied groups as regard post-operative complications.

	Ligation		Cauterization		X^2	P-value
Recurrent epistaxis	3	15%	4	20%	0.17	0.677
Nasal crustation	1	5%	6	30%	**4.3**	**0.037 S**
Synechia	0	0%	3	15%	3.2	0.071
Sinusitis	1	5%	3	15%	1.11	0.291
Paresthesia of nose or soft palate	0	0%	2	10%	2.1	0.146
Septal perforation	0	0%	0	0%	----	----
Necrosis of inferior turbinate	0	0%	0	0%	----	----
Mortality	0	0%	0	0%	----	----

DISCUSSION

The aim of this study was to compare between transnasal endoscopic sphenopalatine artery ligation [TESPAL] and cauterization for control of posterior epistaxis, estimate failure rate and complications. No statistically significant difference between studied groups as regard preoperative co-morbidities. It was hypertension [45 %in ligation group vs. 40% in cauterization group], diabetes mellitus [15% in ligation group vs. 20% in cauterization group], use of anti-aggregates [45% in ligation group vs. 35% in cauterization group] and use of anti-coagulants [15% in ligation group vs. 10% in cauterization group]. This coincides with Tessler *et al*. [8]; they perform 15-year single center experience of 87 patients submitted to sphenopalatine artery ligation with nearly the same preoperative co-morbidities.

The etiology of severe epistaxis cannot be defined for all cases. There is confusion between predisposing and aggravating factors, and they do not necessarily establish a causal link to bleeding. Clear nosebleed etiology is established for only [20% in ligation group vs. 15% in cauterization group], and idiopathic cases are more prevalent. In our study, etiology was: hypertensive peaks [15% in ligation group vs. 5% in cauterization group], bleeds following recent nose and paranasal sinus surgery [0% in ligation group vs. 10% in cauterization group], and trauma [5%in ligation group vs. 0% in cauterization group]. The treatment for severe epistaxis of known etiology must include, whenever possible, solutions for the cause of the problem; for example, the management of hypertensive peaks and reversal of coagulopathy.

In this study, there was no statistically significant difference between studied groups as regard side of surgery. It was noticed more in the right side [60% in ligation group vs. 55% in cauterization group] than in the left side [35% in ligation group vs. 40% in cauterization group] and bilateral in [5% in both groups]. This coincides with Saraceni *et al*. [9] they perform 11 years of follow-up of 98 patients submitted to surgery for epistaxis and it was also more in the right side [48%] than in the left side [35%].

In this study, there was no statistically significant difference between studied groups as regard approached arteries during surgery It was found SPA 1 branch [30% in ligation group vs. 20% in cauterization group], SPA 2 branch [60% in ligation group vs. 65% in cauterization group] and SPA >2 branches [10% in ligation group vs. 15% in cauterization group]. This coincides with Saraceni *et al*. [9]. they perform 11 years of follow-up of 98 patients submitted to surgery for epistaxis and it was found SPA 1 branch [22%], SPA 2 branch [70%] and SPA >2 branches [8%].

A study done by Pádua and Voegels [10] on cadavers submitted to nasal endoscopy showed that 67.21% of the nasal fossae had one arterial trunk leaving the spheno-palatine foramen, 21.31% had two branches, and 11.47% had three. The difference against the literature may be explained by the greater difficulty dissecting the sphenopalatine foramen during surgery in live patients than in fresh cadavers.

No statistically significant difference between studied groups as regard length of surgery [mean duration 58 ± 14.4 minutes in ligation group vs. 61.5 ± 13.9 minutes in cauterization group] and hospitalization [mean duration 2.7 ± 0.5 days in ligation group vs. 2.6 ± 0.5 days in cauterization group]. However, in Saraceni *et al*. [9] study the length of surgery was [113 ± 44minutes] and hospitalization was [3.3± 4.5days]. The difference may be due to larger number of patients [98] included in their study.

McDermott *et al*. [5] showed that the duration of hospitalization was 3 days when TESPAL was administered in the first 24 hours, whereas it was 6 days in the case where TESPAL was applied in a late step following tampering with a buffer in the first step. In the same study, it was stated that the application of TESPAL was more cost-effective in the early period.

In this study, the success rate was 85% in ligation group and 80% in cauterization group with no statistically significant difference between studied groups as regard results of surgery. The failure rate was 15% in ligation group and 20% in cauterization group which can be classified to early recurrent epistaxis < 2 weeks [66.7% in ligation group vs. 75% in cauterization group] and late recurrent epistaxis > 2 weeks [33.3% in ligation group vs. 25% in cauterization group].

This comes in agreement with El-Shamy *et al*. [11] they conduct study on forty patients complaining of recurrent epistaxis. The success rate was 90% in ligation group and 75% in cauterization group. The failure rate was 10% in ligation group and 25% in cauterization group. They classify failure to immediate: post-operative period [24h], Early: Post-operative period [24h:2w] and late [bleeding after 2 weeks].

The failure of ESPAL is mainly due to the inability to identify all the branches of the SPA, the slipping of surgical clips when used and missed bleeding from the ethmoidal arteries. The variation in the anatomy and position of the sphenopalatine foramen and its accessory foramina and the extensive branching of the SPA [sometimes more than four branches], can provide a challenge intra-operatively. Less frequently, persistent bleeding occurs from anastomotic branches of the pharyngeal artery distal to the point of ligation near the sphenopalatine foramen [12].

Kitamura *et al*. [13] conduct study on 28 patients required SPA surgery. Success rate was 89% which comes in agreement with this study. Tessler *et al*. [8] conduct study on 87 patients to evaluate the role of endoscopic sphenopalatine artery ligation in the management of persistent epistaxis. Success rate was 88% which comes in agreement with this study.

Kharel *et al*. [14] conduct study on 31 patients

underwent SPA cauterization during the one-year period. The overall success rate of SPA cauterization was 87.1% which comes in agreement with this study. İsmi *et al*. [15] conduct retrospective analysis of 30 patients with endoscopic sphenopalatine artery ligation in posterior epistaxis. The overall success rate of SPA ligation was 90% which comes in agreement with this study

Saraceni *et al*. [9] perform 11 years of follow-up of 98 patients submitted to SPA surgery for epistaxis. Success rate was 86 % and failure rate was 14% which comes in agreement with this study. Agreda *et al*. [16] conduct retrospective study of 50 patients with ligation of the sphenopalatine artery in posterior epistaxis. The overall success rate of SPA Ligation was 86% which comes in agreement with this study. O'Flynn and Shadaba [17] conduct retrospective study of 12 patients on management of posterior epistaxis by endoscopic clipping of the sphenopalatine artery. Success rate was 84 % and failure rate was 16% which comes in agreement with this study.

Nouraei *et al*. [18] made a retrospective chart review of patients undergoing Sphenopalatine artery ligation between January 1995 and 2005. Sixty-seven patients underwent 71 operations to occlude the sphenopalatine artery to treat epistaxis refractory to conservative therapy. In 45% of cases, an intranasal clip was the only method of ligating the SPA, and 14% of patients received SPA diathermy only. In 41% of patients, both clip ligation and diathermy were used. The overall success rate was about 90% which comes in agreement with this study.

Yavuz *et al*. [19] conduct study on 10 patients who had endoscopic sphenopalatine artery ligation and/or cauterization. The surgical success rate was found to be 100% which is higher than this study and can be explained by the difference between number of patients included in the study.

Shrestha [20] conduct study on 12 patients who had endoscopic sphenopalatine artery ligation and/or cauterization. The surgical success rate was found to be 100% which is higher than this study and can be explained by the difference between number of patients included in the study.

Christian and Tranum-Jensen [21] conduct study on endoscopic sphenopalatine artery ligation or diathermy. The success rate of Ligaclip application was 96% [81 patients] and 100% [45 patients] using diathermy alone or in combination with ligation which is higher than this study and can be explained by the difference between number of patients included in the study.

A study by Dutta and Haldar [22] to evaluate the outcome of transnasal endoscopic sphenopalatine artery ligation in managing refractory posterior epistaxis reported the outcome of TESPAL was most favorable when the procedure done combining both clipping and cauterization of the SPA, along with cauterization of the posterior nasal artery and the septal artery region.

A study by Holzmann *et al*. [23] showed higher rebleed rates were seen in cases in which only the lateral branches of the sphenopalatine artery were occluded. This data supports the need to thoroughly explore the spheno-palatine foramen, in an active search for all branches arising from it. Holzmann also reported increased success rates when dissection and occlusion of the septal branches of this vessel were performed. Rebleeds occurring in those cases can be accounted for by the antegrade flow that occurs mainly in the septal territory, an area with many anastomoses between different arterial systems.

Kumar et al. [24] reviewed the publication dates for eleven case series of transnasal endoscopic SPA ligation ranged from 1996 to 2001. The success rate was 96% [81 patients] when using ligaclip alone, 100% [16 patients] when using diathermy alone, and 100% [29 patients] when using diathermy plus clip. Comparisons with other treatments options show that SPA ligation had a higher success rate than the other treatments. The success rates for the other treatments were: 93% [145 patients] with transnasal microscopic ligation of sphenopalatine artery; 93% [15 patients] with ligation of external carotid artery; 91% [100 patients] with transantral ligation of internal maxillary artery; 90% [10 patients] with transnasal microscopic SPA ligation; 88% [108 patients] with percutaneous embolization of internal maxillary artery; 83% [6 patients] with endoscopic electric cautery.

In this study, minor complications noticed in some patients such as: nasal crustation [5% in ligation group vs. 30% in cauterization group], synechia [0% in ligation group vs. 15% in cauterization group], sinusitis [5% in ligation group vs. 15% in cauterization group] and paresthesia of nose or soft palate [0% in ligation group vs. 10% in cauterization group]. No statistically significant difference between studied groups as regard post-operative complications except for nasal crustation, it was more in cauterization group [30%]. No major complications noticed in any patients such as: mortality, necrosis of inferior turbinate or septal perforation. This comes in agreement with El-Shamy *et al*. [11]; they conduct study on forty patients complaining of recurrent epistaxis. The complications rate was nasal crustation [15%], synechia [15%], sinusitis [10%] and paresthesia of nose or soft palate [5%]. The use of intranasal diathermy was associated with higher incidence of certain post-operative complication like crustations and synechia which also noticed in this study.

Conclusion: The study showed the efficacy of transnasal endoscopic sphenopalatine artery ligation and cauterization in the management of refractory posterior epistaxis with overall success rate 85% in ligation group and 80% in cauterization group. Both methods [ligation and cauterization] are simple and effective for the management of intractable posterior epistaxis with slight advantage of ligation that it showed less post-operative complications.

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None

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