Prelacrimal versus canine fossa approach for anterior maxillary sinus lesions

Samer B. Kamel, Hossam A. Gad, Hossam M. Abdelazeem, Mohammed G. A. Elnems

Department of Otorhinolaryngology, Faculty of Medicine, Benha University, Benha, Egypt

Correspondence to Mohammed G. A. Elnems, ORL Department, Faculty of Medicine, Benha University, Benha, Egypt
Zip code: 12345; Tel: 01008033673
e-mail: elnems44@yahoo.com

Received 30 June 2020
Revised: 17 August 2020
Accepted 06 September 2020
Published 21 January 2021

Pan Arab Journal of Rhinology
2020, 10:118–126

Introduction
Extensive disease in the maxillary sinus is difficult to clear with standard instrumentation during traditional endoscopic sinus surgery, so access to the anterior and anterolateral walls of the maxillary sinus is often difficult despite the creation of a large maxillary antrostomy or the use of adjuvant surgical procedures such as canine fossa puncture to gain improved access and allow for good debridement of maxillary sinus.

Objective
To study the outcome of prelacrimal approach compared with canine fossa approach (CFA) for surgical treatment of anterior maxillary sinus diseases.

Patients and methods
A randomized prospective clinical study, in which 40 patients with recurrent anterior maxillary sinus lesion were divided into two equal groups: group I included 20 patients who underwent endoscopic prelacrimal recess approach (PLRA), and group II included 20 patients who underwent endoscopic CFA. Patients were evaluated between February 2018 and October 2019. The two groups were compared regarding facial pain, facial numbness, cheek swelling, nasal obstruction, epiphora, inferior turbinate destabilization, inferior turbinate-nasolacrimal duct flap status, crustations, synechiae, bleeding, infection, and antrochoanal polyp recurrence.

Results
Operation time was significantly longer in CFA group II (38 min) compared with PLRA group I (27 min) (P<0.001). Cheek swelling was significantly higher in CFA group in comparison with PLRA group (P<0.001). Facial numbness and facial pain were significantly higher in CFA group compared with PLRA group at 1 week postoperatively (P=0.047 and 0.025, respectively). There were no significant differences between both groups regarding type of lesion and recurrence (P=1.0 for each).

Conclusion
PLRA is a safe and simple technique for manipulation of anterior maxillary sinus lesions with short operative time and minimal postoperative complications.

Keywords:
canine fossa approach and endoscopic sinus surgery, maxillary sinus, prelacrimal recess approach

Pan Arab J Rhinol 10:118–126

Introduction

Functional endoscopic sinus surgery is the gold standard surgical treatment in patients with chronic rhinosinusitis. It has an 80–90% success rate in primary surgeries [1].

The success rate decreases to 50–70% in revision surgeries [2]. The approach to the severely diseased sinuses, especially the maxillary sinus, is still controversial because of the anatomy of the maxillary sinus and the characteristics of diseases originating in it [2].

The maxillary sinus diseases can be grouped as non-neoplastic (inflammatory processes, infections, cysts, and polyps), neoplastic benign, and neoplastic malignant [3].

Prelacrimal recess is a concavity in the medial and anterosuperior part of the maxillary sinus (Fig. 1). It is located in front of the eminence of the lacrimal passages on the medial sinus wall [2].

The canine fossa is a depression on the anterior surface of the maxilla below the infraorbital foramen and lateral to the canine eminence and the incisive fossa (Fig. 2) [4].

Extensive disease in the maxillary sinus is often difficult to clear with traditional endoscopic sinus surgery, so access to the anterior and anterolateral walls of the maxillary sinus is often difficult despite the creation of a large maxillary antrostomy or the use of adjuvant

surgical procedures such as canine fossa puncture to gain improved access and allow for good debridement of maxillary sinus [5].

It is common to access the anterior part of the maxillary sinus through a canine fossa puncture. Such punctures were performed by making a small incision through the oral mucosa and penetrating the thin bone of the fossa with a trocar [6].

The endoscopic prelacrimal recess approach (PLRA) provides a clear view. It provides accurate, minimally invasive, and complete removal of benign maxillary sinus lesions. It is a physiological and functional surgery and has great advantages in treating the diseases of the nose and paranasal sinuses [7].

Patients and methods

A randomized prospective clinical study in which 40 patients were divided randomly by sealed envelopes, who underwent endoscopic nasal surgery: 20 of them underwent endoscopic prelacrimal approach and the other 20 underwent endoscopic canine fossa approach (CFA) for recurrent anterior maxillary lesions. The average age ranged from 17 up to 45 years. There were 25 males and 15 females. Patients were selected from those attending the ENT outpatient clinic at Benha University Hospitals presenting with unilateral maxillary lesion.

The study was approved by the local ethical committee of Benha University, and an informed consent was taken from patients before participating in the study.

Inclusion criteria were recurrent anterior maxillary sinus lesions.

Exclusion criteria were patients with age less than 17 years old, patients with maxillary sinus malignant tumors, and patients with bleeding tendency.

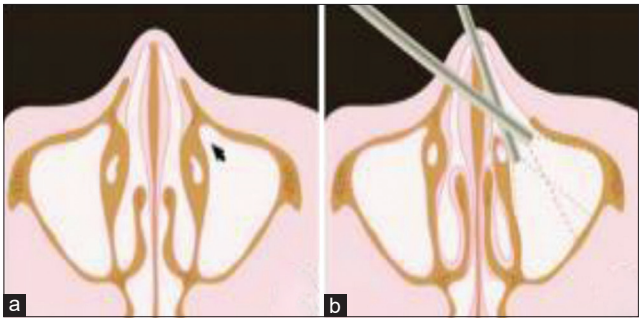
Preoperative endoscopic examination of the nose, paranasal sinuses, and nasopharynx in addition to multislice computed tomography scan were done.

Surgical details

All surgeries were performed under general anesthesia. Maxillary middle meatal antrostomy and uncinectomy were done unless if it had been performed in previous surgery. In both groups, the part of the lesion that was extending from the maxillary sinus to inside the nasal cavity and choana was resected through the middle meatus using different angled nasal endoscopes.

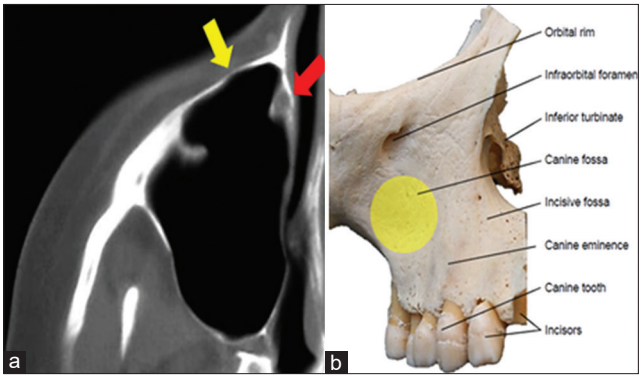
In PLRA group I, we used the same standard technique of Zhou *et al.* [10], in which local hemostasis was achieved by injecting 2 ml of 1% xylocaine and adrenaline 1:200 000 into the nasal septum, inferior turbinate (IT), and lateral nasal wall adjacent and anterior to the IT (Fig. 3a). A curved mucosal incision on the lateral wall of the nasal cavity was made between the anterior aspect of the IT and the edge of the pyriform aperture to the bone (Fig. 3b). The mucosa from the subperiosteal level was elevated posteriorly to the insertion site of the IT, and then the bony attachment of the IT was disconnected (Fig. 4a).

Figure 1



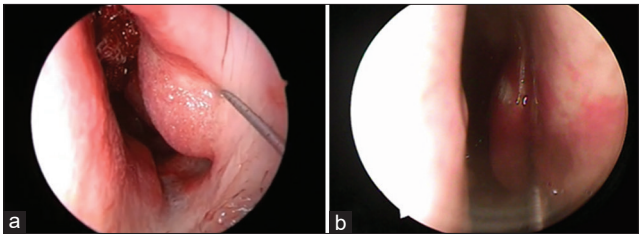
Schematic diagram shows the cavity of maxillary sinus can be easily observed under 0° rigid endoscope via the prelacrimal recess approach. Arrow prelacrimal recess [8].

Figure 2



Canine fossa: (a) thin bone of canine fossa (yellow arrow); nasolacrimal duct (red arrow). (b) Right canine fossa (yellow), incisive fossa and canine eminence [9].

Figure 3



Steps of PLRA: (a) injection of diluted adrenaline at site of incision. (b) A curved mucosal incision between the anterior end of the inferior turbinate (IT) and posterior end of the nasal vestibule. PLRA, prelacrimal recess approach.

The bony inferior orifice of nasolacrimal duct (NLD) could be seen after the mucoperiosteum was elevated posteriorly. We chiseled off the anterior bony portion of the medial wall of the maxillary sinus (part of the maxillary frontal process), and after chiseling the bone posteriorly, the NLD was exposed, and the IT-NLD flap was formed (Fig. 4b and c). The IT-NLD flap was pushed medially, and the anteromedial wall of the maxillary sinus was exposed (Fig. 5a). The maxillary sinus was entered through the antrostomy made at the prelacrimal recess (Fig. 5b). The maxillary sinus was exposed widely when the antrostomy was adequately enlarged, and all pathological tissues were removed under direct visualization with 0° telescope (Fig. 5c). The IT-NLD mucosal flap was repositioned, and the incision was sutured at the end of the operation (Fig. 6).

In CFA group (II), canine fossa puncture was performed after infiltration of the sublabial region with 2 ml of 1% xylocaine and adrenaline 1 : 200 000, and then a small incision of 3 mm above the line of reflection and starting at the canine ridge runs laterally for 3.5–4 cm parallel to the teeth was made. Penetration of the thin bone of the fossa was done with a trocar using a gentle twisting motion [11]. In some patients with thicker bone, gentle tapping with a hammer was required for the trocar to be inserted [12]. The antrostomy was 4 mm in diameter and was widened using an osteotome to allow instrumentation of the maxillary sinus. Polyps and diseased tissue were removed from the maxillary sinus, and closure of the sublabial incision was done using 3-0 absorbable vicryl sutures (Figs. 7 and 8).

Follow-up: all patients included in this work attended postoperative follow-up visits weekly for 1 month, followed by monthly visits for 3 months, and then at 6 months.

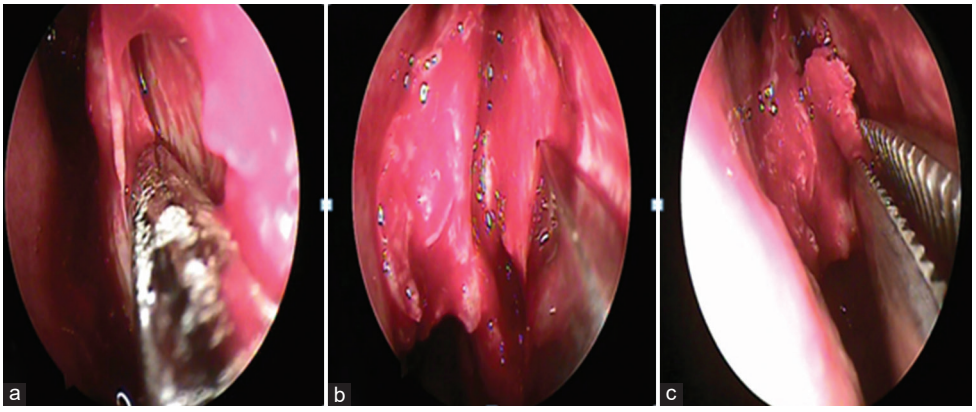
All patients were subjected to the following.

Subjective assessment

All patients were asked about any facial pain, facial numbness, cheek swelling, nasal obstruction, and epiphora.

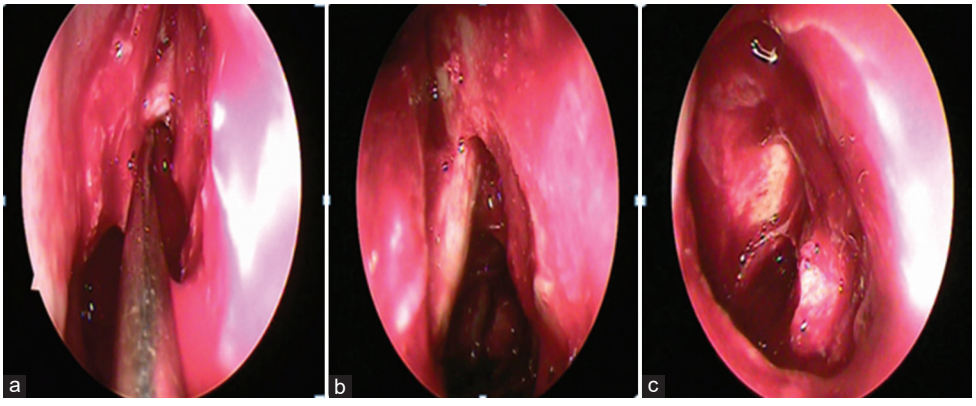
Facial was assessed using visual analog scale [13] (Fig. 9).

Figure 4



(a) Mucoperiosteum elevated posteriorly until the attachment of inferior turbinate (IT). (b and c) Chiseling of the anterior bony portion of the medial wall of the MS. MS, maxillary sinus.

Figure 5



(a) Chiseling of bone posteriorly to expose NLD, (b) partial removal of anteromedial bony wall of the MS, and (c) close endoscopic view of the entire maxillary sinus throw the prelacrimal recess opening. NLD, nasolacrimal duct; MS, maxillary sinus.

Epiphora was assessed using fluorescein disappearance test by instilling a drop of sterile 2% fluorescein into the conjunctival fornixes of the eye to be examined and then the tear film was observed. Persistence of significant dye (inadequate clearance of the dye from the tear meniscus over a 5-min) indicates an obstruction.

Figure 6

Endoscopic view of left nasal cavity showing closure of the incision by absorbable sutures.

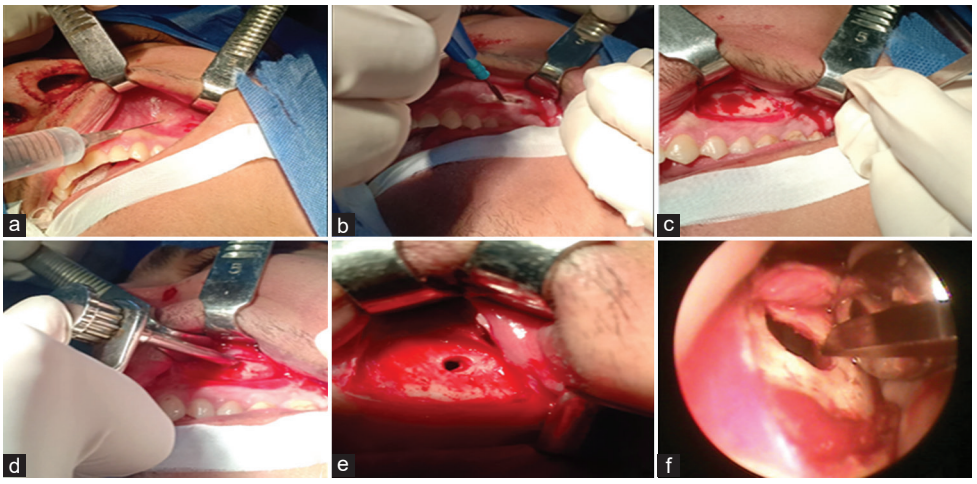
Objective assessment

The postoperative evaluation in the follow-up visits included nasal endoscopic evaluation of the IT destabilization, crustations, synechiae, bleeding, IT-NLD flap status, infection, and antrochoanal polyp recurrence.

Statistical analysis

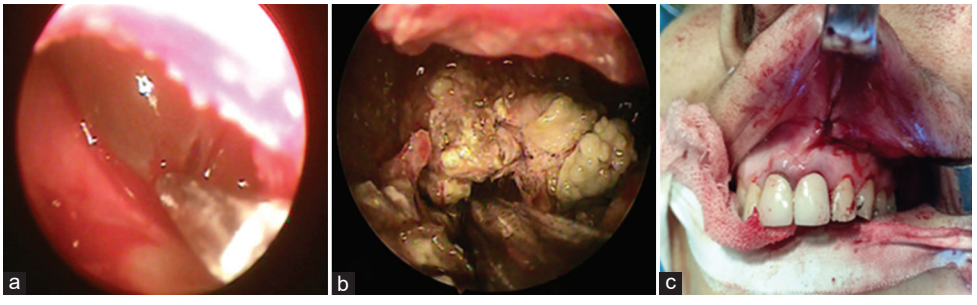
(1) Data management and statistical analysis were done using SPSS, vs. 25. (IBM, Armonk, New York, USA).
(2) Numerical data were summarized as means and SDs.
(3) Categorical data were summarized as numbers and percentages.
(4) Comparisons were done between both groups using Mann–Whitney U test for numerical data.
(5) Categorical data were compared using χ^2 test or Fisher's exact test if appropriate.

Figure 7



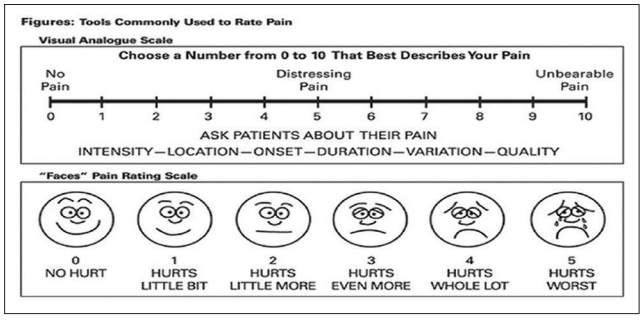
Steps of CFA: (a) injection of diluted adrenaline at the site of sublabial incision, (b) sublabial incision corresponding to canine fossa, (c) widening of incision exposing bon of canine fossa, (d and e) penetrating the thin bone of the fossa with a trocar using a gentle twisting motion, and (f) widening of the opening by chisel. CFA, canine fossa approach.

Figure 8



Steps of CFA: (a) endoscopic view of maxillary sinus pathology (polyp) throw canine fossa opening, (b) canine fossa endoscopic view showing fungal ball, and (c) repositioning of the flap and closure of the incision. CFA, canine fossa approach.

Figure 9



Visual linear analog scale (VAS) (0–10 numeric pain distress scale) [13].

(6) All *P* values were two sided. *P* values less than 0.05 were considered significant.

Results

The study included 40 patients with recurrent anterior maxillary sinus lesion, and they were classified into two groups: group I included 20 patients, where 11 (55%) patients were men and nine (45%) patients were female. Male to female ratio was 11:9. Their ages ranged from 19 to 45 years, with an average age of 30 ± 9 years. Group II included 20 patients, where 13 (65%) patients were men, and seven (35%) patients were females. Male to female ratio was 13:7. Their ages ranged from 18 to 44 years, with an average age of 29 ± 9 years (Table 1).

There were no significant differences between both groups regarding age, sex, and type of lesions (*P*=0.896, 0.519, and 1.0, respectively) (Table 1).

Intraoperative

Operation time was significantly longer in group II (38 min) compared with group I (27 min). *P* value was less than 0.001 (Table 1).

There were no significant differences between both groups regarding IT destabilization and bleeding. *P* values were 0.231 and 0.168, respectively (Table 2).

Bleeding was moderate in amount (frequent suctioning required and bleeding threatens surgical field directly after suction is removed).

Postoperative data

Postoperative follow-up visits were weekly for 1 month, followed by monthly visits for 3 months, and then at 6 months.

Table 1 Comparison between the studied groups regarding postoperative facial pain and numbness, cheek swelling, epiphora, crustations, synechiae, bleeding, inferior turbinate-nasolacrimal duct flap status, infection, and antrochoanal polyp recurrence

	Group I [*n* (%)]	Group II [*n* (%)]	*P*
Facial pain			
At 1 week			
Yes	8 (40)	15 (75)	0.025
At 1 month			
Yes	4 (20)	9 (45)	0.091
At 2 months			
Yes	2 (10)	5 (25)	0.407
At 6 months			
Yes	1 (5.0)	3 (15)	0.605
Facial numbness			
At 1 week			
Yes	4 (20.0)	10 (50.0)	0.047
At 1 month			
Yes	3 (15.0)	6 (30.0)	0.451
At 2 months			
Yes	3 (15.0)	6 (30.0)	0.451
At 6 months			
Yes	1 (5.0)	5 (25.0)	0.182
Cheek swelling			
At 1 week			
Yes	4 (20.0)	15 (75.0)	<0.001
At 1 month			
Yes	1 (5.0)	10 (50.0)	0.001
At 2 months			
Yes	0	0	–
At 6 months			
Yes	0	0	–
Epiphora			
At 1 week			
Yes	1 (5.0)	0	1.0
At 1 month			
Yes	1 (5.0)	0	1.0
At 2 months			
Yes	1 (5.0)	0	1.0
At 6 months			
Yes	1 (5.0)	0	1.0
Crustations			
At 1 week			
Yes	8 (40.0)	0	0.003
At 1 month			
Yes	0	0	–
At 2 months			
Yes	0	0	–
At 6 months			
Yes	0	0	–
Synechiae			
At 1 week			
Yes	2 (10.0)	0	0.487
At 1 month			
Yes	0	0	–
At 2 months			
Yes	0	0	–
At 6 months			
Yes	0	0	–

Contd...

Table 1 Contd...

	Group I [*n* (%)]	Group II [*n* (%)]	*P*
Bleeding			
At 1 week			
Yes	1 (5.0)	3 (15.0)	0.605
At 1 month			
Yes	0	0	–
At 2 months			
Yes	0	0	–
At 6 months			
Yes	0	0	–
IT-NLD flap status			
At 1 week			
Yes	2 (10.0)	0	0.487
At 1 month			
Yes	0	0	–
At 2 months			
Yes	0	0	–
At 6 months			
Yes	0	0	–
Infection			
At 1 week			
Yes	1 (5.0)	3 (15.0)	0.605
At 1 month			
Yes	0	0	–
At 2 months			
Yes	0	0	–
At 6 months			
Yes	0	0	–
Antrochoanal polyp recurrence			
At 6 months			
Yes	1 (5.0)	2 (10.0)	1.0

IT-NLD, inferior turbinate-nasolacrimal duct. χ^2 test or Fisher's exact test was used.

Facial pain

Facial pain was significantly higher in group II (75.0%) compared with group I (40.0%) at 1 week postoperatively (*P*=0.025).

There were no significant differences between both groups at 1 month (*P*=0.091), 2 months (*P*=0.407), and 6 months (*P*=0.605) (Table 3).

Facial numbness

Facial numbness at the upper central and lateral incisors was significantly higher in group II (50.0%) compared with group I (20.0%) at 1 week postoperatively (*P*=0.047).

There were no significant differences between both groups at 1 month (*P*=0.451), 2 months (*P*=0.451), and 6 months (*P*=0.182) (Table 3).

Cheek swelling

Cheek swelling was significantly higher in group II compare with group I postoperatively at 1 week (*P*<0.001), at 1 month (*P*=0.001).

There was no patient complaining of cheek swelling in both studied groups at 2 and 6 months postoperatively (Table 3).

Nasal obstruction

There were no significant differences between both groups regarding nasal obstruction at all follow-up points. At 1 week postoperatively, *P* value was 0.749, and at 1 month, *P* value was 0 (Table 3).

Epiphora

There were no significant differences between both groups regarding epiphora at all follow-up points (*P*=1.0) (Table 3).

The postoperative evaluation in the follow-up visits included nasal endoscopic evaluation of the following:

Crustations

Crustations at incision site were significantly higher in group I (40%) compared with group II (0.0) at 1 week postoperatively (*P*=0.003) (Table 3).

There were no significant differences between both groups at rest of follow-up points.

No crustations at incision site were reported after 1 month postoperatively in both groups.

Synechiae

There were no significant differences between both groups regarding synechia at all follow-up points. *P* value at 1 week postoperatively was 0.487. Synechiae in group II appeared 3 weeks postoperatively between the lateral nasal wall (particularly on the inferior edge of the mucosal flap) and septum just superior to the inferior turbinate and was treated appropriately (Table 3).

Bleeding

There were no significant differences between both groups regarding bleeding at all follow-up points. At 1 week, *P* value was 0.605 (Table 3). Bleeding was moderate in amount and presented within the first month postoperatively and controlled by anterior nasal packing.

Inferior turbinate-nasolacrimal duct flap status

There were no significant differences between both groups regarding IT-NLD flap status at all follow-up points. At 1 week postoperatively, *P* value was 0.487.

Two (10%) patients had a small bare area in group I, which healed spontaneously after 1 month, whereas in group II, there was no disturbance of the IT or NLD area (Table 3).

Table 2 Comparison between the studied groups as regard to intraoperative inferior turbinate destabilization and bleeding

	Group I [*n* (%)]	Group II [*n* (%)]	*P*
IT destabilization			
Yes	3 (15.0)	0	0.231
Bleeding			
Yes	4 (20.0)	8 (40.0)	0.168

IT-NLD, inferior turbinate. χ^2 test was used.

Table 3 Comparison between the studied groups regarding age distribution, sex, operation time, and type of lesion

	Group I (*n*=20)	Group II (*n*=20)	*P*
Age			
Mean±SD	30±9	29±9	0.896
Sex [*n* (%)]			
Males	11 (55.0)	13 (65.0)	0.519
Females	9 (45.0)	7 (35.0)	
Operation time			
Mean±SD	27±7	38±6	<0.001
Lesions [*n* (%)]			
Antrochoanal polyp	9 (45.0)	9 (45.0)	1.0
Fungal ball	2 (10.0)	1 (5.0)	
Fungal sinusitis	4 (20.0)	5 (25.0)	
Inverted papilloma	2 (10.0)	1 (5.0)	
Maxillary cyst	3 (15.0)	4 (20.0)	

Mann-Whitney *U* test was used for age and operation time. χ^2 test was used for categorical data.

Infection

There were no significant differences between both groups regarding infection at all follow-up points. At 1 week postoperatively, *P* value was 0.605 (Table 3).

Endoscopic examination of these patients showed edematous and hyperemic mucosa with yellowish purulent discharge. Parenteral antibiotics were given.

Antrochoanal polyp recurrence

There were no significant differences between both groups regarding antrochoanal polyp recurrence. *P* value was 1.0. Recurrence was detected by computed tomography scan, done sixth months postoperatively (Table 3).

Two cases of CFA show open sublabial incision at 2-week follow-up interval period and need reclosure of the incision with 3-0 absorbable vicryl sutures.

Discussion

According to the anatomy of maxillary sinus and the characteristics of the diseases originating from it, which were assessed with multiangled telescopes, including 30 and 70 telescopes, with different kinds of curved instruments, there are still some hidden areas that cannot be viewed and handled [2].

Our study was conducted on 40 patients and divided into two groups: group I included patients operated through prelacrimal approach and were as follows: nine (45%) patients with antrochoanal polyp, four (20%) patients with fungal sinusitis, three (15%) patients with maxillary cyst, two (10%) patients with fungal ball, and one (10%) patient with inverted papilloma. However, group II patients operated through CFA and were as follows: nine (45%) patients with antrochoanal polyp, five (25%) patients with fungal sinusitis, four (20%) patients with maxillary cyst, one (5%) patient with fungal ball, and one (5%) patient with inverted papilloma.

In our study, there were no significant differences between both groups regarding age distribution, sex distribution, and type of lesions (*P*=0.896, 0.519, and 1.0, respectively).

Regarding mean operation time, it was significantly longer in CFA group (38 min) compared with PLRA group (27 min) (*P*<0.001). This observation is in agreement with the results of the study by Al Ayadi *et al*. [8], in which the mean operation time of the PLRA was 30 min.

In our study, postoperative bleeding was found in only one (5%) patient in PLRA group and three (15%) patients in CFA group. It was moderate bleeding and managed by anterior nasal pack in the outpatient clinic, and the difference was statistically insignificant at all follow-up points (*P*=0.605).

Our study is in agreement with Sathananthar *et al*. [14], who reported that there were no patients who operated by CFA had arterial bleeding from the antrostomy site intraoperatively or postoperatively.

In our study, facial numbness was significantly higher in CFA group as 10 (50.0%) patients complained of numbness at the upper central and lateral incisors compared with PLRA group, whereas four (20.0%) patients complained of numbness at 1 week postoperatively (*P*=0.047 for each). By the end of sixth-month follow-up interval, there was one (5%) patient who continued to complain of facial numbness at the upper central and lateral incisor in PLRA group, but in CFA group, there were five (25%) patients who continued to complain of facial numbness. This agreed with the study by Weber *et al*. [15], who reported only one individual had persistent facial numbness among 20 patients underwent PLRA.

Facial numbness is thought to be caused by injuries to the branches of the infraorbital nerve, principally the anterior superior alveolar nerve and less commonly

the middle superior alveolar nerve [16]. The damage of infraorbital nerve in CFA is more liable and severe owing to injury of the nerve when elevating periosteum up to the infraorbital canal during creation of the antral window in CFA. Otherwise, in PLRA, damage of the nerve, which could happen because of thermal injury by cauterization, is transient and minimal.

The study by Al Ayadi *et al*. [8] gave nearly the same results of our study regarding facial numbness that occurred in the upper central incisors at the PLRA side in five (25%) patients as early as at 2 weeks postoperatively, and during follow-up period, only one (5%) patient continued to complain of numbness for 2 years postoperatively.

Weber *et al*. [15] reported that in PLRA, facial numbness is caused by a lesion of the superior alveolar nerve, which runs through the bone of the anterior maxillary sinus wall.

Regarding facial pain, it was significantly higher in CFA group (75.0%) compared with PLRA group (40.0%) postoperatively at 1 week (P=0.025 for each). By the end of 6 months, we reported only one patient complaining of facial pain in PLRA group in comparison with three patents in the CFA group. This observation is in agreement with the results of the study by Robinson *et al*. [5] which reported facial pain in 12 (32%) patients operated with CFA and by the end of sixth-month follow-up interval, only one (7.1%) patient was still complaining of facial pain. Facial pain may be owing to extensive cauterization during creation of sublabial incision or owing to injury of the infraorbital nerve or superior alveolar nerve.

Al Ayadi *et al*. [8] reported one patient with facial pain at the PLRA side, and this facial pain was owing to extensive use of drill.

In our study, cheek swelling was significantly higher in CFA group in comparison with PLRA group postoperatively at 1 week (P<0.001) and at 1 month (P=0.001). One week postoperatively, four (20%) patients of PLRA group developed cheek swelling in comparison with 15 (75%) patients who developed cheek swelling in CFA group, and by the end of the second month, there was no cheek swelling in both groups. This observation is nearly in agreement with the results of the study by Robinson *et al*. [5], which reported cheek swelling in 14 (38%) patients operated by CFA.

The study by Byun and Lee [17] reported that although several complications occurred with CFA (e.g., cheek swelling, facial pain, and numbness), these symptoms resolved spontaneously with no symptom persisting at 3 months after the procedure, and these results do not agree with our result in CFA group, as facial numbness and facial pain persist after 3 months postoperatively.

The study by Comoglu *et al*. [18] conducted on 12 patients operated by PLRA reported that three (25%, 3/12) patients had synechiae, whereas our study reported two (10%, 2/20) patients of PLRA group had synechiae.

In our study, only one patient was complaining of persistent epiphora in PLRA group, whereas in CFA group, there was no patient complaining of epiphora; the difference between both groups was statistically insignificant (P=1.0).

Zhou *et al*. [19] reported NLD injury occurred in two patients during endoscopic removal of schwannoma of the pterygopalatine and infratemporal fossae via the PLRA, but neither had epiphora postoperatively, which does not agree with our study, in which one patient complained of persistent epiphora following PLRA.

Ismaeil and Abdelazim [20] reported no recurrence in patients operated by prelacrimal recess during follow-up period, which is not in agreement with our study, as we reported three cases.

The study by Zhou *et al*. [21] reported a disadvantage of PLRA that the IT-NLD mucosal flap is redraped onto its original position, so the anterior half of the maxillary sinus and zygomatic recess laterally is difficult to be evaluated even with the use of flexible endoscopy postoperatively. In our study, no cases were reported with disturbed IT-NLD mucosal flap.

Al Ayadi *et al*. [8] performed a comparative study of the incidence of complication after prelacrimal approach and endoscopic sinus surgery of maxillary sinus lesions and reported that the PLRA is a minimally invasive technique, with minimal complications in the form of facial numbness (25%), facial pain (25%), facial swelling, bleeding (5%), crustations (95%), synechiae (15%), epiphora (5%), and IT-NLD flap disturbance (15%). This agreed with our study.

Zhou *et al*. [10] stated that, by means of the PLRA, all areas of the maxillary sinus should be easy to reach under a 0° rigid nasal endoscope. This is in agreement with our current study in that the 0° endoscope could be used successfully in most parts of the operation.

The main advantage of PLRA is a wide surgical field for all maxillary sinus walls without violation of the NLD and IT. Our study showed that benign maxillary sinus tumors attached to various sites of the maxillary sinus

could be removed, and gross total resection is possible. In addition, PLRA can preserve the periosteum of the canine fossa area, which is the manipulated site of the CFA. Periosteum plays a role as a primary barrier to prevent maxillary sinus disease from invading the skin of the cheek. When CFA is performed for maxillary sinus inverted papilloma, if the final pathology result is confirmed as squamous cell carcinoma, the approach site could become a spreading route [22]. Therefore, PLRA has an advantage that the periosteum of the canine fossa area can be left as a barrier.

Conclusion

PLRA is a safe technique for manipulation of anterior maxillary sinus lesions with short operative time and minimal postoperative complications.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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