



## ANTROCHOANAL POLYP: A REVIEW OF 38 CASES

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### ABSTRACT

**Background:** Antrochoanal polyp is originating from maxillary sinus and emerging from its natural or accessory ostia to extend backward to choana. Aim: To evaluate demographical, clinical, radiological and histopathological characteristics, and analysis its various surgical removal techniques. **Patients and Methods:** 38 patients with antrochoanal polyp were enrolled in current case series study, the diagnosis done by clinical examination, endoscopy and sinus computerized tomography scan whom underwent surgical removal, were investigated and studied. The improvement was assessed via visual analogue scale and Lund-Kennedy score at regular basis. The follow-up was within 1 year. **Results:** Males (60.6%) and females (39.4%), mean age (15±274 SD), all them (100%) arise from maxillary sinuses and unilateral, it emerged (68.42%) from natural and (34.21%) from accessory ostia, and attachment site was the antral posterior wall (65.78%), nasal obstruction was presenting symptom (100%), and overall nasal symptoms improvement by Visual analogue scale from (7.69 ± 1.95) to (1.64± 52.6) postoperatively, and by Lund-Kennedy score the success rate was (97.36%). Specimen's histopathological characteristics (100%) confirmed diagnosis. The endoscopic sinus surgery was done in all patients, either alone (92.10%), or accompanied with transcanine sinuscopy (5.26%), or with modified Caldwell Luc (2.63%). One recurrence occurred after endoscopic sinus surgery alone, while no recurrence was found after combined procedures. **Conclusion:** Slight male predominance, affect children and young adults, arise from maxillary sinuses, unilateral, nasal obstruction was main presenting clinical symptom, it emerges rather from natural than accessory ostia, attachment site was mainly posterior wall. The best surgical removal by endoscopic sinus surgery, done either alone, or combined with transcanine sinuscopy or modified Caldwell-Luc procedures, and most important factors affecting choice of surgical approaches were patient age, origin attachment site, and in doubt about complete removal of polyp.

**KEYWORDS:** Antrochoanal polyp; Endoscopic sinus surgery; Transcanine sinuscopy; Modified Caldwell-Luc procedures.

### INTRODUCTION

The antrochoanal polyp (ACP), also, named as "Killian's Polyp" is defined as a benign, solitary, dumbbell shaped polypoid lesion that originated from the oedematous mucosa of the maxillary sinus consists of 3 components according to its extension: the "antral part" is almost always cystic and the other is "nasal part" which is solid pedicle protruding via the main or accessory ostium into the nasal cavity where it grows posteriorly toward the choana and nasopharynx "choanal part", without eroding or destroying contiguous soft tissue or bony structures, it mainly seen in children and young adults, its more common in males than females, studies estimated that its accounts about 4-6% of all nasal polyps in general

population and in the pediatric group this proportion increases to 33%. However, in children with cystic fibrosis; it constitutes 6-48%, and they are often being unilateral but may be bilateral cases were found on rare occasions.<sup>[1,2]</sup>

Although its etiology is still not precisely known, many others have suggested that, the inflammatory reactions is responsible, however some authors have indicated that allergies could be a role.<sup>[2]</sup>

The most common attachment site was mainly from the posterior wall, nearby the maxilla-ethmoidal angle of

maxillary sinuses, while, other sites of origin rarely either the sphenoid or ethmoid sinuses.<sup>[3]</sup>

A common symptom is nasal obstruction mainly unilateral, and the sign is visible by anterior rhinoscopy as mass, and also, by nasal endoscopy and paranasal sinus computed tomography (CT) are considered the gold standard tools for diagnosis.

In the maxillary sinus CT scan the ACP was detected as soft tissue mass without bony erosion, which may protrude via the natural or accessory ostium to the nasal cavity that, grows posteriorly toward the choana (nasopharynx).<sup>[4]</sup>

Surgery is considered as the main line in ACP treatment, "simple avulsion polypectomy", however, it may lead to high recurrence rate up to 25%. As the Caldwell–Luc operation exhibits wide exposure and so it ensures complete removal of the both its antral part and the maxillary sinus mucosa, with a low incidence of recurrence, but, in children it does leads to significant risks to the developing teeth (especially canine teeth) and centers of maxillary bone growth, beside to other comorbidities, like cheeks swelling, a prolong recovery time, long-lasting neuralgic pain, and cheeks numbness in children.<sup>[1]</sup>

So, currently the role of endoscopic surgical technique (ESS) in the treatment of ACPs as this is the most conservative treatment modality, so the trans-nasal endoscopic approach has become as the treatment of choice with the advent of endo-nasal instrumentation, with an endoscopic large middle meatus antrostomy (MMA) by using an angled endoscopes, that permitting effective avulsion of polyp with little morbidity, with detection of precise its origin in order to avoid the incidence of recurrence.<sup>[5]</sup>

However, ESS alone may could be not be sufficient or enough surgical method to remove PAC en bloc because of the inaccessibility to its antral part in the maxillary sinus wall, as well as, narrow intranasal structures as; nasal cavity and middle meatus.<sup>[6]</sup>

Hence, devolvement of several combined surgical techniques used such as transcanine sinuscopy (TS) and modified Caldwell-Luc (MCL) operation with ESS, which have been recently established and considered as the best surgical techniques for removal of ACP polyp specially the antral part.

However, little information was found in the studies regarding the comparison of these methods.<sup>[7]</sup>

Aim of the current study was to review the antrochoanal polyp in regard to its demographic distribution, clinical features, preoperative and post-operative assessment, in addition specimen's histopathological study, and to

evaluate a various surgical techniques and complications, as well as, to estimate the incidence of recurrence rate.

## PATIENTS AND METHODS

After acquiring the legitimate and ethical necessity from institute scientific committee, taking a consent from all patients participated by explaining the aim of the study, counselling the patients about the character of the surgical procedures and their benefit and possible complications, and insuring them about the confidentiality of the collected data which will be anonymous and data will not be used for any purpose other than this research.

Thirty-eight patients were enrolled in this case series study whom diagnosed with antrochoanal polyp (ACP) which were done by clinical examination, nasal endoscopy and paranasal sinus computed tomography (CT).

The exclusion criteria were pregnancy, psychological problems obtained from the patient's medical report cards, difficult to comply with regular follow-up or with the study protocol, also, if there were contraindication to general anesthesia, and, any medical, or/and surgical treatments that implicating on the study results, as well as, a previous sinus or/and surgery, also, recurrent ACP, and any cases of polypoidal mass other than ACP, all these conditions were excluded from the current study.

## Clinical assessment of improvement

The improvement was assessed by 1. Subjective visual analogue scale (VAS) for nasal symptoms via a validated test which its score ranged from 0 (no complaint) to 10 (extreme complaint). 2. Objective nasal endoscope in which the improvement in these endoscopic findings were recorded according to "Lynch-Kennedy grading system"; as for polyp (1= absent, 2= restricted to middle meatus, 3= beyond the middle meatus). While for mucosal edema into (0= normal; 1= mild, 2= severe) being grades 0 and 1 labelled as considerable mucosal improvement rate.

Also, complete nasal examination including diagnostic nasal endoscopy was performed, and the type of surgical techniques used was studied and analyzed. These evaluations were done regularly after the surgery, and the final assessment was taken at the last visit.

The time interval between the patient clinical presentation and the date of the operation was also estimated. Follow-up was within 1 year.

Operative procedures: "total removal of ACP to avoid recurrence"

Endoscopic sinus surgery (ESS) with middle meatus antrostomy (MMA); under general endotracheal anesthesia using hypotensive technique with reverse trendelenberg position. The procedure started with nasal

application of topical decongested as 10% oxymetazoline nose spray and local anaesthesia as 5% Lidocaine (solution) spray. A standard Messerklinger technique was used with conventional endoscopic sinus surgery instruments. Surgery started with first step which was uncinectomy. This procedure was important because it allows complete exposure of the middle meatus and then, the natural maxillary ostium, will ultimately be connected to the accessory ostium, forming a large opening, providing wide access to all aspects of the maxillary sinus.

Examination of the sinus confirmed to complete its removal and visualization of whole maxillary sinus with special attention to lateral maxillary wall with preservation of intact mucosa as much as possible. The nasal part of the polyp was removed with a forward biting Blakesley's forceps and its antral part was resected with a curved Blakesley's forceps or Hawezer forceps, all these manipulation was performed under the control of 4mm 0, 30, 70 angled Hopkins rigid endoscope.

In some cases, where direct visualization and removal of the origin of the ACP was shown some difficulty in estimation, as in cases when ACP origin found in anterior or antero-lateral walls of maxillary sinus, so a complete removal of antral part will be not effectively approached by ESS alone, therefore, the endoscopic approach (FESS) was accompanied with transcanine sinuscopy (TC). This done by making a trocar puncture in the canine fossa via small hole about 0.5 cm in diameter, and the inside the maxillary sinus was examined with an endoscope using trocar sheath, so the antral part of ANP was completely removed via canine fossa using fine forceps and under endoscopic control an angled forceps intra-nasally through the enlarged sinus ostium too.

Again, when estimated that ESS alone was not able to remove ACP completely, as in cases were the ACP is attached to the anterior wall of the maxillary sinus, and in polypoidal maxillary sinus mucosa, a modified Caldwell-Luc (MCL) operation then was used in combination with ESS So in this technique, a hole about 1 cm in diameter was opened at the anterior wall of the maxillary sinus and the remnants of antral polyp were removed from this hole, and also, the endoscope was used through this hole to view the status of maxillary sinus mucosa. A nasal component is gently mobilized at the pedicle this done by making endoscopic antrostomy of maxillary sinus.

At the end of surgery, Merocel nasal packs (Medtronic, USA) were inserted into the nasal cavity for 2 days. Antibiotics were given with nasal saline douching. Regular follow-up with meticulous cleaning of crusts was carried out after postoperatively for 12 months. All ACP specimens were send for histopathological study to determine the histological diagnostic characteristics.

In post-operative check-up, the middle meatus antrostomy of the maxillary sinus were observed with nasal endoscopy, CT was done selectively where the examination showed some complications or/ and problems, improvements in clinical symptoms by VAS and endoscopic findings were also evaluated, all symptoms scores before surgery were compared with those at the last postoperative visit. Follow-up was within 1 year.

#### Statistical analysis

Using SPSS-20 Data was presented in simple measures of percentage, mean, frequency, standard deviation (SD), and range (minimum-maximum) values.

Students-t-test was used for (quantitative data), while Pearson Chi-square was used to test for (qualitative data), which was considered significant when P value was  $\leq 0.05$ .

#### RESULTS

Among the total 38 patients with ACP, there were 23 males (60.6%) and 15 females (39.4%), male to female ratio (1:1,2) with  $P= 0.0562$  (statically non-significant), also, the age ranging from 9 to 31 years, with mean age was  $(15\pm 274)$  SD). The chief presenting symptom was nasal obstruction in all patients (100%); being unilateral in 33 patients (86.8%) and bilateral in 5 patients (13.2%), and the other associated nasal symptoms were shown in table 1.

**Table 1: Other associated nasal symptoms.**

Other symptoms	Number of patients	Percentage
Nasal discharge	24	63.15 %
Snoring/ mouth breathing	17	44.73%
Post nasal drip	13	34.21%
Headache	11	28.94%
Smell abnormality	2	5.26%
Nasal itching/sneezing	1	2.63%

Upon endoscopic examination, the ACPs were found it emerged from natural ostium in 25 patients (68.42%), and from accessory ostium, as seen in 13 patients (34.21%), with  $P=0.0458$  which is statically significant. Also its extension into the choana and nasopharynx were found in all patients (100%), while it clearly seen in oropharynx in 12 patients (31.57%), and the  $P=0.002$  (statically significant), as, see in figure 1.



Figure 1: (ACP seen in oropharynx).

Moreover, in 32 patients (84.21%), they were seen during nasal examination, while in 6 patients (15.78%) not seen by nasal examination especially in children, as  $p=0.032$  which mean it was statically significant.

All cases (100%), were arise from maxillary sinuses, and were unilateral (100%). Regarding its side; in 20 patients (52.63%) it was found on the left side, and in 18 patients (47.36%), were detected on right maxillary sinus, as  $P=0.659$  (statically non-significant), figure 2 revealed CT scan for sinuses.

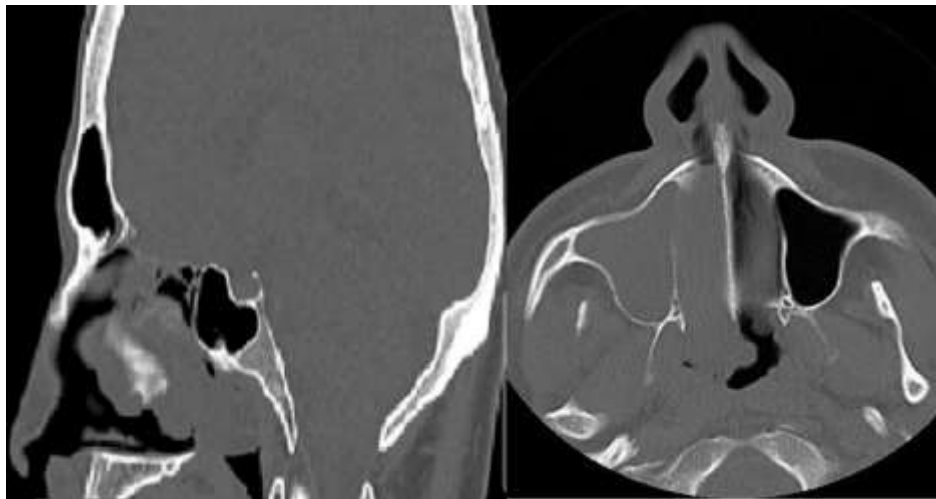


Figure 2: (CT sinuses scan showing ACP).

There was normal contralateral maxillary sinus, as well as, both ethmoidal and sphenoid sinuses in all patients (100%). Normal middle turbinate was found in 33 patients (86.84%), while unilateral concha bullosa was present in 2 patients (5.26%), being on the same side, and bilateral concha bullosa was seen in 3 patients (7.89%). Septum deviation was noted in 6 patients (15.78%), being 4 cases of them (10.52%) on the opposite side of ACP, while the remaining 2 cases (5.26%) were detected on the same side of lesion. Normal size inferior turbinate was detected in 32 patients (84.21%), while in 6 patients (15.78%) showed moderate enlargement. Although in all those pathological anomalies the P value  $<0.05$  which means statically

significant, but these associated pathological lesions were moderate in degree and did not need surgical correction.

**Regarding the surgical procedures**

Endoscopic intranasal sinus surgery alone was done in all patients, but it done alone in 35 patients (92.10%), it accompanied with transcanine sinuscopy in 2 patients (5.26%), and it accompanied with modified Caldwell Luc operation in 1 patient (2.63%), the most frequent attachment site detected was the posterior wall in 25 patients (65.78%). As table 2 reveal the surgical results in detail.

Table 2: Surgical results of antrochoanal polyp (ACP).

Surgical technique	Number and percentages of patients	Adults/ children	Appearance of antral part of ACP	Side wall attachment of ACP	Emerged via the ostium
Endoscopic sinus surgery (EES) alone	35 patients (92.10%)	20 Adults 15 Children	31 Cystic 4 Polypus	25 Posterior 9 Lateral 4 Anterior	23 Natural 12 Accessory
Endoscopic sinus surgery accompanied with transcanine sinuscopy	2 patients (5.26%)	1 Adult 1 Child	1 Cystic 1 Polypus	1 Anterior 1 Lateral	1 Natural 1 Accessory
Endoscopic sinus surgery accompanied with modified Caldwell-Luc	1 patient (2.63%)	1 Adult	1 Polypus	1 Lateral	1 Natural

### Recurrence of lesion

No recurrence was seen in the patients whom underwent endoscopic sinus surgery accompanied with transcanine sinuscopy or accompanied with modified Caldwell-Luc operations, so the success rate was (100%), figure 3 showed removal of ACP in total. While 1 patient of 35 patients (2.85%) who done endoscopic intranasal sinus surgery alone had post-operative recurrence of the lesion, so the success rate was (97.14%), as the P- 0.001 which mean it statically significant.



**Figure 3: (Size and Total Removal of ACP).**

### Clinical assessment in the clinical improvement

Subjective evaluation via Visual Analogue Scale (VAS): Of overall nasal symptoms, and the main nasal presenting symptom which was nasal obstruction.

So according to VAS score: Preoperative assessment of overall nasal symptoms was ( $7.69 \pm 1.95$ ), then improved to ( $1.64 \pm 52.6$ ) postoperatively, this improvement was statically significant as  $P=0.021$ . While for nasal obstruction was ( $8.97 \pm 23.2$ ) before surgery, then improved to ( $1.34 \pm 72.1$ ) postoperatively, this improvement was statistically significant as  $P=0.011$ .

### Objective evaluation via Lund-Kennedy score system

The endoscopic observation showed that; regarding the polyp there were 37 patients (97.36%) had no polyp, as 1 patient had recurrence, while for mucosal edema there were 34 patients (89.47%) showed an endoscopic improvement of grade 0, and 3 patients (7.89%) showed improved to grade 1, so there was a considerable improvement rate (97.36%), as the findings in grades 0 and 1 were pointed as considerable improvement.

The histopathological characteristics of ACPs specimens which confirmed the diagnosis of the lesion: Light-microscopic examination of Hematoxylin and Eosin (H and E) stained preparations revealed that the mucosal surface was respiratory epithelium in all patients (100%).

Complications related to the surgical methods applied in the current study revealed that, there were no intraoperative complications in all patients (0%), while the postoperative intranasal adhesion was seen in 3 patients (7.89%) as in those patients whom underwent endoscopic sinus surgery alone with  $P=0.0132$  (statically significant).

Facial swelling in that 1 patient when the endoscopic sinus surgery was combined with modified Caldwell-Luc procedure. The average time between symptoms onset and the date of the surgical intervention was  $7 \pm 682$  SD months.

### DISCUSSION

Although, it's a rare disease, Killian's Polyps have been taken a little consideration recently, it's a benign, dumbbell shaped unilateral disease that originate from the posterior wall of the maxillary sinus emerged from the natural or accessory ostium of the sinus into the nasal cavity then grows back toward the choana (nasopharynx), and it may reach the oropharynx in some longstanding cases.<sup>[8]</sup>

The current study found that males were affected more than females, with average age before 20 years, and this means that ACP is the disease of children and young adults, also, nasal obstruction was the main (chief) clinical symptom especially "unilateral", and these observations were in line with many other studies.<sup>[2, 8-11]</sup>

Also, this study revealed that, the ACP was unilateral (100%), arise (100%) from maxillary sinuses (right or left), these findings were agreed with other studies<sup>[7-10]</sup>, however, Hammouda Y, et al.<sup>[11]</sup> reported that, even they are often unilateral, but bilateral lesion maybe seen on rare occasions. The exit of ACP was done via natural or accessory ostia of the maxillary sinus, and this finding was agreed with the following studies.<sup>[5, 7, 10-12]</sup>

In evaluating the co-morbidities and associated pathology, in the current study noted that, the concha bullosa was (13.15%), septum deviation was (15.78%), inferior turbinate hypertrophy was (15.78%), other study done by C. Ozer et al,<sup>[12]</sup> observed that (16%) had lower turbinate hypertrophy, (32%) had deviated nasal septum.

### Regarding the surgical procedures

The original surgical method of treating was by simple avulsion polypectomy without involving the sinus mucosa, however, it results in long-term failure, as this technique had a high rate of recurrence due to insufficient resection of the intramaxillary portion of the polyp.<sup>[12]</sup>

In the current study, the endoscopic intranasal sinus surgery alone was done in all patients, either alone or in selected cases it may accompanied with other methods as transcanine or modified Caldwell-Luc operations. Many studies concluded that endoscopic sinus surgery has

recently been shown to be a safe and effective method for treating antrochoanal polyps, it consists of resection of the nasal part of the polyp and the cystic antral part with attachment to the maxillary wall via the middle meatus.<sup>[12]</sup>

Lee TJ and Huang SF<sup>[13]</sup> they used the transnasal endoscopic approach for antrochoanal polyps that originating from the inferior and posterior walls of the maxillary sinus and the combined endoscopic with transcanine approach for polyps originating from the lateral walls of the maxillary sinus.

In this study, showed, the success rate was 100% “no recurrence” was seen in those patients whom underwent ESS combined with tran canine or modified Caldwell-Luc approaches, while, when ESS done alone there was (2.85%) recurrence, to compare these results with other studies. As De Freitas MR et al,<sup>[8]</sup> reported that, (12.5%) recurrence rate after transnasal endoscopic surgery, and Kelles M et al,<sup>[14]</sup> in their study showed the recurrence rate was higher in the ESS group compared with ESS plus mini-Caldwell group, as well as, Atighechi S et al,<sup>[15]</sup> in their study found that, if ESS was combined with a mini-Caldwell approach had minimal recurrence rate and low complications incidence, so they concluded that this technique is a useful method for the removal of ACP completely.

Lee TJ and Huang SF<sup>[13]</sup>, they used the transnasal endoscopic approach for ACPs originated from the inferior and posterior walls of the maxillary sinus, saving the more invasive combined endoscopic and transcanine approach for polyps originated from the lateral wall or in revision surgery, they reported success rate of the transnasal endoscopic approach and the combined endoscopic middle meatal and transcanine approach as 76.9% and 100%, respectively. As mentioned earlier, Ozer C et al<sup>[12]</sup>, performed FESS combined FESS and transcanine sinuscopy or the Caldwell Luc approach for the treatment of ACPs, they found recurrence in 3 patients after FESS only, yet they found no recurrence after combined FESS and transcanine sinuscopy or with the Caldwell Luc approach.

Alghonaim Y et al,<sup>[10]</sup> concluded in their study, that ESS is the appropriate treatment of ACP in contrast to more invasive open procedures, and, Hamouda Y et al,<sup>[11]</sup> revealed that all patients were underwent surgical management via an endoscopic endonasal approach with the removal of the ACP en bloc under general anesthesia, also, Saafan EM and Tomoum OM<sup>[9]</sup> study noted that, the success rate was 85.7% in the endoscopic transnasal approach, with 2 patients treated with ESS approach showed recurrence, and 100% when it combined endoscopic transcanine approach.

Again Lee TJ and Huang SF<sup>[13]</sup> reported in their study revealed a success rate of 76.9% in ACPs managed by the transnasal endoscopic approach compared with 100%

with the combined endoscopic and transcanine approach. As well as, Franche GLDS et al,<sup>[16]</sup> reported a recurrence rate of 6.9% with ACP managed by the endoscopic transnasal approach.

Regarding the clinical assessment were done by VAS and also, by endoscopic evaluations, the current study found there were significant improvement of overall nasal symptoms and considerable endoscopic improvement of maxillary sinus mucosa, and these results were agreed with Saafan EM and Tomoum OM study.<sup>[9]</sup>

Histological results of the current study; confirmed the diagnosis, and the Light-microscopic examination of H- and E- stained preparations revealed that the mucosal surface was respiratory epithelium in all patients (100%), and this agreed with following studies.<sup>[11,17,18]</sup>

About the complications related to the surgical methods applied in the current study; there were postoperative intranasal adhesion (7.89%), as in those patients whom underwent FESS alone, and facial swelling when it combined with modified Caldwell-Luc procedure, same results were seen by Yaman H et al,<sup>[19]</sup> in their study found that, the transcanine approach procedure may had some complications, such as, anaesthesia and swelling of the cheek, infraorbital nerve injury, and trauma to the growing teeth and growth centers of the maxilla.

In current study, the average time between symptoms onset and the date of the surgical intervention was  $7 \pm 682$  SD months, this was confirmed by AL-Ani RM<sup>[6]</sup>, who reported that, there was “a long time taken between the child’s symptoms and the date of surgery” due to misdiagnosis.

#### Limitations of the current study

Small sample size and short follow up time, and the recurrent cases which were excluded from the current study it thought that, it was better to be included.

#### CONCLUSION

Males were affected more than females, with ratio (1:1.2), the mean age was before twenty, nasal obstruction was being the main presenting clinical symptom, also, it found to be unilateral lesion, and arise from maxillary sinuses, emerged from its either natural or accessory ostia, then grows posteriorly toward the nasopharynx, appearing in some cases in the oropharynx, the most frequent attachment origin site detected was the posterior wall of the maxillary sinus, it may associated with some pathological anomalies of the nose and sinuses, as well as, the histopathological specimens examination confirmed its diagnosis.

The endoscopic sinus surgery was a reliable choice for the removal, it can be either applied alone with some incidence of recurrence rate, or in selected cases it can be combined with other surgical approaches such as

transcanine sinuscopy or a modified Caldwell Luc techniques with high success rate (no recurrence).

The most important factors affecting choice of surgical approaches were patient age, origin attachment site, and doubt about complete removal of the polyp.

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