A Retrospective Comparative Study on the Outcome of Microscope-Assisted Technique and Supra-Auricular Approach in Preauricular Sinus Surgery in a Tertiary Care Hospital

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Context: Preauricular sinus (PAS) can lead to severe complications such as facial paralysis, and squamous cell carcinoma may develop from this sinus later in life. Asymptomatic sinus needs no intervention, but symptomatic sinus needs surgical interventions.

Aims: This study compares the surgical outcome of microscope-assisted sinus tract excision technique with the supra-auricular sinectomy technique.

Settings and Design: This was a retrospective, observational study conducted at a tertiary care hospital in Purulia District, West Bengal, India.

Subjects and Methods: Records of patients operated on for PAS were included following the proper inclusion and exclusion criteria. These patients were categorized and followed up based on disease pathology and the type of intervention received.

Statistical Analysis Used: Data were collected, tabulated, and analyzed using the standard statistical software.

Results: Fifty-two patients were included in our study. About 48.07% of patients were found in the age group of 11–15 years. In the microscope-assisted sinectomy category, recurrence of the disease was seen in 2 out of 15 operated patients compared to 1 patient among 13 in the supra-auricular sinectomy approach for uncomplicated cases. In complicated cases, the supra-auricular sinectomy approach had a nil recurrence rate compared to three patients out of ten operated in microscope-assisted technique (Fisher’s exact test - 0.0593). Both the outcomes are not statistically significant.

Conclusion: Supra-auricular sinectomy technique has the lowest recurrence rate for preauricular sinus surgery.

Keywords: Microscope, preauricular sinus, sinectomy, supra-auricular, surgical outcome

INTRODUCTION

Preauricular sinus (PAS) is a common congenital malformation characterized by a nodule, dent, or dimple located adjacent to the external ear. This condition has been known to humans for a long time, but its first medical description is attributed to Heusinger and Virchow.(¹) It usually occurs at the ascending limb of the helix.(²) It also occurs along the lateral surface of the helical crus, the posterosuperior margin of the helix, the tragus, or the lobule. There is a different hypothesis of the development of the PAS. The most widely accepted hypothesis is a defective fusion of the first and second Hillock of His.(³) Another theory of the development of PAS stated that it develops as an isolated ectodermal...
folding which forms an inclusion dermoid during auricular development.[3] PAS may develop as a separate entity or be associated with some syndromes such as Melnick–Fraser syndrome, Beckwith–Wiedemann syndrome, and Lachiewicz–Sibley Syndrome. The incidence of unilateral PAS is about 1.3%, and the bilateral case is 0.3%.[4]

Many PASs remain asymptomatic throughout life, but some cases cause repeated sinus infections leading to pain, fever, abscess formation, and ugly skin or scar formation in the face anteroinferior to the tragus. PAS can lead to severe complications such as facial paralysis due to its proximity to the facial nerve.[5] Chronic inflammation is a risk factor for carcinoma development; a squamous cell carcinoma may develop from this sinus later in life.[1] Asymptomatic sinus needs no intervention, but symptomatic sinus needs surgical interventions. Surgical intervention for the PAS is usually indicated after at least two subsequent infections.[6,7] Surgical treatment options to deal with PAS are (i) simple sinectomy technique, (ii) microscope-assisted sinus tract excision, and (iii) supra-auricular sinectomy technique.

However, the real problem of PAS surgery is a very high recurrence rate in the standard surgical procedure, the incidence of which ranges from 19% to 40%.[8,9] The simple sinectomy method is the classical and most commonly performed operation. An elliptical incision is made around the opening of the sinus, and the sinus tract is excised by the normal dissection method with or without prior dye injection into the sinus opening. In the microscopic-assisted technique, the incision and dissection are the same as in the classical sinectomy method. However, the whole procedure is done with the help of an operative ENT microscope to visualize the sinus tract or any remnants under magnified vision [Figure 1]. PASs always lie superior and lateral to the parotid gland, facial nerve, and temporalis fascia.[10] With this fact in mind, Prasad et al. proposed a supra-auricular sinectomy technique for PAS surgery.[10] The upper limb of the elliptical incision around the sinus is extended upward and backward, winding around the upper attachment of the helix up to the lower attachment of the temporalis muscle. Tissue is further dissected in respective planes to identify and dissect the sinus tract along with its medial attachment to deeper structures if any [Figure 2].

Our institutional protocol includes the deployment of all three abovementioned surgical procedures (sinectomy, microscope-assisted sinus tract excision, and supra-auricular sinectomy technique) for treating symptomatic cases of the PAS. Classical simple sinectomy technique is gradually falling out of practice due to its high recurrence rate (19%–40%).[5,9] This retrospective observational study aims to compare microscope-assisted sinus tract excision technique with supra-auricular sinectomy technique in terms of postoperative recurrence.

**Subjects and Methods**

It is a retrospective, observational study conducted in India at a tertiary care hospital in Purulia district of West Bengal, India. All patients who were operated on for PAS between January 2016 and July 2020 for a total of 43 months were selected for this study. Patient records and contacts were collected from the record section of our hospital. Cases were selected according to strict inclusion and exclusion criteria. The inclusion criteria were (i) age <5 years, (ii) surgery performed by microscopic-assisted technique and supra-auricular sinectomy technique, (iii) patients who had the same preoperative protocol with surgery done only after 12 weeks of subsidence of infection, and (iv) same surgical team performed all the surgeries under the expert guidance of a senior surgeon. The exclusion criteria are (i) surgery done by conventional sinectomy method and (ii) cases lost to follow-up. The selected patients were advised to attend the outpatient’s department (OPD) for history taking and examination and were followed up for at least 1 year. In our study, from the records, we categorized the patient’s disease pathology into two groups, uncomplicated and complicated cases of PAS. The operational definition for uncomplicated cases includes (i) a history of occasional discharge from the sinus opening, (ii) no history of abscess formation and drainage of abscess, and (iii) no history of previous PAS surgery. The complicated cases include (i) recurrent abscess formation in the perisinus region and (ii) history of operative intervention on the same-sided PAS, including abscess drainage. The operation was considered successful when there is no sign of infection, abscess formation, or recurrence of any sinus opening in the preauricular area following 12 weeks of operation[5] and in the follow-up period of at least 1 year. The procedure is considered a failure/disease recurrence when there were any signs of infection at the surgical site following 12 weeks after the operation. Data were collected, tabulated, and analyzed using standard statistical software.

**Results**

A total of 62 patients were primarily selected for our study, but 10 patients were excluded based on the inclusion and exclusion criteria. Hence, a total of 52 patients were included in our study. Among 52 patients, 22 were male and 30 were female patients...
Among 52 cases, 25 cases had left-sided sinus and 27 had right-sided sinus [Table 1].

In the study population, 48.07% of patients were found in the age group of 11–15 years and 9.61% were found in the age group of >20 years. About 23.07% of the study population belongs to the pediatric age group [Table 2].

In the study population, 28 cases were classified as uncomplicated PAS, and the rest were complicated. Surgical intervention in the form of microscope-assisted sinectomy and supra-auricular sinectomy approach had been done in both patient groups [Table 3].

In the uncomplicated PAS group (n = 28), a total of 15 patients were operated on in the microscope-assisted sinectomy technique. Thirteen had undergone supra-auricular sinectomy. In the microscope-assisted sinectomy category, recurrence of the disease was found in 2 out of 15 patients. In the supra-auricular sinectomy approach, the recurrence rate was 1 out of 13 patients. Both the techniques were statistically correlated in the uncomplicated cases of PAS by Fisher’s exact test. Fisher’s exact test value is 1. Thus, the statistical outcome is not significant at \( P < 0.05 \).

In the complicated PAS group (n = 24), a total of ten patients were operated on in the microscope-assisted sinectomy technique. Fourteen had undergone supra-auricular sinectomy. In the microscope-assisted sinectomy category, recurrence of the disease was found in three out of ten patients. In the supra-auricular sinectomy category, recurrence of the disease was found in one out of eleven patients.
sinectomy approach, the recurrence rate was nil. Both the surgical techniques were statistically correlated in the complicated cases of PAS by Fisher’s exact test. Fisher’s exact test value is 0.0593. Thus, the statistical outcome is not significant at $P < 0.05$.

**Discussion**

The incidence of the PAS shows a slight female preponderance. In our study, the male:female ratio is 1:1.36. There is a slight female preponderance. The study of An et al. mentioned that the female gender is more statistically associated with PAS. P.A.Ss are inherited as an incomplete autosomal dominant pattern with reduced penetrance and variable power of expression. This might justify the above finding.

In our study, in cases of uncomplicated PAS, microscopic-assisted technique had 13.33% (2 out of 15) recurrence and supra-auricular sinectomy technique had 7.69% (1 out of 13) recurrence rate. In complicated cases, microscopic-assisted technique had 30% (3 out of 10) recurrence, whereas no recurrence was found in supra-auricular sinectomy technique. Hence, the recurrence rate of the disease pathology is less in the supra-auricular sinectomy approach in both groups. Moreover, the recurrence rate is nil when the supra-auricular sinectomy approach is followed in complicated cases. However, there is no statistically significant difference in postoperative outcome in both the groups intervened by either of the surgical methods ($P < 0.05$).

A study by Lam et al. showed that the recurrence rate was 32% in the simple sinectomy method and 3.7% in supra-auricular approach. Gur and his colleagues found that the overall recurrence rate was 9.09%. In their study, it was found that the group of patients presented with an active infection at the time of surgery and their recurrence rate was 15.79%. When no infection was present at the time of surgery, the recurrence rate was 8.22%. Baatenburg de Jong showed that the classical sinectomy method has a recurrence rate of about 11.76%. Vijayendra et al. found no recurrence in 36 cases done by the supra-auricular method. Mundra et al. found no recurrence of the PAS in the supra-auricular technique. El-Anwar and El-Assar showed that the simple sinectomy method has a recurrence rate of 1.3%.

Recurrence of the PAS after surgery is due to incomplete sinus tract excision and remnant residual squamous epithelium. In the simple sinectomy method, high recurrence (19%–40%) is due to the tortuous course of the sinus tract, highly variable sinus course, and multiple numbers of ramifications, particularly the terminal ramifications, which are very difficult for surgeons to follow. Several methods such as dye (methylen blue), probing, microscope, and magnifying glasses are used to identify the sinus tract correctly. None of them guaranteed against recurrence after operation. However, a very high recurrence rate of 21.95% was found in the group of patients in whom no modalities were used to identify the sinus tract. In microscopic-assisted technique, an operating microscope is used to magnify the operative field, and efforts are made to identify the sinus tract, its ramifications of branches, and remnant epithelium. Even with the use of the operating microscope, surgeons find it very difficult.

### Table 1: Classification of the study population based on sex and laterality of the disease pathology

| Study participants | Number |
|--------------------|--------|
| Number of patients initially selected | 62     |
| Number of patients lost during follow-up | 10     |
| Total number of patients selected for study | 52     |
| Male patients | 22     |
| Female patients | 30     |
| Left-sided PAS | 25     |
| Right-sided PAS | 27     |

PAS: Preauricular sinus

### Table 2: Age and gender distribution of patients

| Age group (years) | Male | Female | Percentage of patients in each age group |
|-------------------|------|--------|----------------------------------------|
| 6-10              | 5    | 7      | 23.07                                  |
| 11-15             | 12   | 13     | 48.07                                  |
| 16-20             | 10   | 7      | 19.23                                  |
| >20               | 5    | 3      | 9.61                                   |

### Table 3: Classification of patients presenting with preauricular sinus into two groups, i.e., uncomplicated cases and complicated cases of preauricular sinus

| Uncomplicated cases ($n=28$) | Complicated cases ($n=24$) |
|------------------------------|----------------------------|
| Microscopic-assisted technique (15) | Supra-auricular technique (13) | Microscopic-assisted technique (10) | Supra-auricular technique (14) |
| Success (%) | Failure (%) | Success (%) | Failure (%) | Success (%) | Failure (%) | Success (%) | Failure (%) |
| 13 (86.66) | 2 (13.33) | 12 (92.30) | 1 (7.69) | 7 (70) | 3 (30) | 14 (100) | 0 |

Patients in either group received surgical intervention in the form of microscope-assisted sinectomy technique and supra-auricular sinectomy technique. Uncomplicated cases group Fisher’s exact test value=1 ($P>0.05$, no significant difference), Complicated cases group Fisher’s exact test value=0.059 ($P>0.05$, no significant difference).
to identify all the sinus branches, especially when there has been repeated infection or a history of operation of PAS or drainage of the abscess.

The supra-auricular sinectomy approach offers broad exposure and better visualization. The entire track can be dissected en bloc along with its medial boundary, which includes temporalis fascia, pinna cartilage, or superficial lobe of the parotid. En bloc removal ensures a complete tract removal even if the surgeon fails to identify ramifications. This surgical incision can also approach different anatomical variants of the PAS. It justifies the reason for a decreased recurrence rate of PAS following the supra-auricular sinectomy technique.

Tan et al. suggested that wide local excision of sinus is a more preferred technique than the previously preferred simple sinectomy technique. Currie et al. recommended some useful tips for the prevention of sinus recurrence. These include (i) meticulous dissection of sinus by an experienced head and neck surgeon under general anesthesia, (ii) use of an extended preauricular incision, (iii) clearance down to the temporalis fascia to ensure complete removal of the epithelial component, (iv) avoidance of sinus rupture, and (v) closure of dead space in the surgical wound. Surgery performed under local anesthesia has more recurrence rate than those cases done under general anesthesia. More recurrence in local anesthesia is due to limited compliance of patients to the surgical procedure done under local anesthesia.

A limitation of our study is the small sample size. As it is a retrospective study, we could not eliminate the possibility of conformational and selection bias. However, the information regarding recurrence drawn during OPD follow-up for at least 1 year rules out any doubt about the result.

**Concl**usion

Among all the techniques presently employed for PAS surgery, the supra-auricular sinectomy technique has the lowest recurrence rate. This simple and easy to learn technique is useful for complicated cases with a very high success rate.

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**Conflicts of interest**

There are no conflicts of interest.

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