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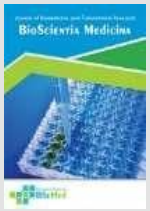

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Single-Stage Bilateral Sinusectomy with Methylene Blue Tract Delineation for Familial Classic Preauricular Sinus Following Right-Sided Abscess Control: A Case Report

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A B S T R A C T

Background. Preauricular sinus is a congenital anomaly arising from incomplete fusion of the auricular hillocks of the first and second branchial arches. The condition shows marked ethnic variation, with bilateral presentations strongly associated with hereditary transmission. Surgical excision remains the only definitive treatment for symptomatic or recurrently infected lesions, yet operative recurrence rates of up to 42% have been historically reported. **Case presentation.** A 24-year-old Indonesian Minangkabau male presented with bilateral preauricular openings present since birth and a recent right preauricular abscess that had been treated with incision and drainage twenty days prior. His father had a unilateral left-sided preauricular pit, consistent with familial transmission. Examination confirmed bilateral classic-type preauricular fistulae anterior to the ascending helix without active discharge, and a quiescent right post-incision wound. Preoperative blood work, renal and hepatic profiles, and chest radiography were within normal limits. The patient underwent simultaneous bilateral preauricular sinusectomy under general anesthesia using methylene blue tract delineation, elliptical skin incision, complete tract dissection with adjacent granulation removal, and primary closure over a small-calibre drain. Postoperative recovery was uneventful; the drain was removed on day three, sutures were removed on day ten, and the surgical wound remained quiescent without recurrence or hypertrophic scarring at the 39-day follow-up. **Conclusion.** Simultaneous single-stage bilateral sinusectomy combined with methylene blue tract delineation, prior infection control, and closed-system drainage produced excellent early outcomes in an adult with familial bilateral classic preauricular sinus.

1. Introduction

Preauricular sinus is one of the most common minor congenital anomalies of the external ear and represents a clinically distinctive entry into the broader spectrum of first and second branchial arch developmental disorders. The lesion was first described by Van Heusinger in 1864 and is now well recognized as a blind-ending epithelial-lined tract that opens on the skin surface near the anterior limb of the ascending helix, communicating with a subcutaneous cystic or branching system embedded in the soft tissues of the preauricular region.[1-3] Embryologically, the sinus is widely attributed to incomplete or defective fusion of the six auricular hillocks—three from the first (mandibular) and three from the second (hyoid) pharyngeal arches—during the sixth week of intrauterine life, leaving an ectodermal inclusion that becomes a clinically relevant pit.[2,4]

The reported prevalence of preauricular sinus varies substantially between geographic regions and ethnic groups. Caucasian populations show prevalences ranging from approximately 0.1% to 1.2%, whereas East Asian, African, and African-American populations exhibit considerably higher prevalences, ranging from 2.4% up to 10%.[5,6] In a large pediatric

cross-sectional study, Yu and colleagues found that Asians had the highest prevalence at 6.6%, followed by African Americans at 4.5%, while South Asians and Latin Americans had no detected cases in their cohort.[5] The condition is unilateral in approximately 75% of cases and bilateral in the remaining 25%, with bilateral disease showing a much stronger familial pattern and a higher likelihood of associated congenital syndromes such as branchio-oto-renal (BOR) or branchio-otic syndrome.[7,8]

Although the majority of preauricular sinuses remain asymptomatic, approximately 25% of patients eventually develop clinical manifestations ranging from intermittent discharge to recurrent infection and frank abscess formation.[9] Once a sinus has become symptomatic, conservative management is generally unsatisfactory because the epithelial lining harbors residual organisms that perpetuate cycles of infection. Complete surgical excision therefore remains the only definitive cure, but the procedure is notoriously prone to recurrence because of the highly variable branching pattern of the tract and the difficulty of identifying all extensions intraoperatively, particularly after multiple episodes of infection and scarring.[10,11]

Numerous surgical refinements have been described to mitigate recurrence, including the classic simple sinusectomy, the supra-auricular approach popularized by Prasad and elaborated by El-Anwar and ElAassar, the inside-out technique introduced by Baatenburg de Jong, methylene blue or gentian violet staining of the tract, microscope-assisted dissection, and excision of a small portion of adjacent helical cartilage.[12-16] In contemporary series employing standardized protocols that combine tract staining, lacrimal probing, and wide local excision, recurrence rates have been reduced to between 1.3% and 5%, a marked improvement on the 14% to 42% rates reported in earlier literature.[17-19]

Despite this progress, several practical questions remain incompletely resolved in routine clinical practice. The optimal timing of definitive surgery after an episode of acute infection, the value of routine intraoperative methylene blue staining, the appropriateness of a one-stage simultaneous bilateral procedure in adults with familial disease, and the role of a small closed-suction or passive drain in preventing dead-space-related complications are all areas where the literature still shows considerable heterogeneity.[20-22] Furthermore, most published case series originate from pediatric otolaryngology units, and dedicated adult-centred reports describing operative decision-making, perioperative pharmacotherapy, and serial wound surveillance through to early scar maturation remain comparatively scarce.

The novelty of the present report lies in its detailed adult-focused narrative of a 24-year-old Minangkabau Indonesian male with familial bilateral classic preauricular sinus who underwent simultaneous bilateral sinusectomy after recent ipsilateral abscess drainage, combining methylene blue tract delineation, extended undermining, primary closure, and short-term passive drainage in a single operative setting. The aim of this study is twofold: first, to document the clinical presentation, perioperative workup, surgical technique, and 39-day postoperative trajectory of an adult patient with hereditary bilateral disease in a Southeast Asian tertiary centre; and second, to synthesize the contemporary literature on preauricular sinus management to derive practical, evidence-anchored learning points for surgeons treating analogous cases.

2. Case Presentation

Ethics and consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying clinical photographs. The institutional review board of Dr. M. Djamil General Hospital approved the publication of de-identified case information.

Demographic profile and chief complaint

Table 1 presents the demographic and clinical characteristics of the patient. A 24-year-old Indonesian male of Minangkabau ethnicity attended the Outpatient Clinic of the Facial Plastic and Reconstructive Subdivision, Department of

Otorhinolaryngology–Head and Neck Surgery, Dr. M. Djamil General Hospital, Padang, complaining of bilateral small openings in front of both ears that had been present since birth. The patient reported that the pits had been asymptomatic for most of his life, but twenty days before the current consultation he had developed a tender, painful, erythematous swelling immediately anterior to the right tragus. He had sought care at the same institution's General ENT–Head and Neck Surgery Clinic, where an incision and drainage of the right preauricular abscess had been performed under local anesthesia. He had subsequently been discharged on a course of oral antibiotics and oral analgesia and was referred to the Facial Plastic and Reconstructive Subdivision for definitive management.

Table 1. Demographic, anthropometric, and clinical characteristics of the patient at presentation.

Characteristic	Finding
Age	24 years
Sex	Male
Ethnicity	Minangkabau (Indonesian)
Occupation	Office worker
Body mass index	Within normal range (calculated routinely)
Chief complaint	Bilateral preauricular openings present since birth
Onset of latest symptom	Right preauricular swelling 20 days prior to admission
Previous intervention	Incision and drainage of right preauricular abscess under local anesthesia (20 days prior)*
Antimicrobial use	Oral antibiotics (course completed prior to current consultation)
History of trauma	None
History of otorrhea / otalgia	None
Hearing-related complaint	None (no hearing loss, tinnitus, vertigo, or aural fullness)
Family history of preauricular pit	Father: unilateral left preauricular pit, asymptomatic
Family history of deafness	None
Maternal pregnancy history	Uncomplicated; no gestational diabetes
Co-morbidity	None
Regular medication	None
Allergy	No known drug allergy

**The right preauricular wound was clinically quiescent at the time of referral, with no purulent discharge, hyperaemia, or fluctuance.*

On directed questioning, the patient confirmed a single previous episode of swelling and discharge from the right preauricular pit approximately thirteen years earlier, which had resolved with topical care alone. He denied any history of otorrhea, otalgia, hearing loss, tinnitus, aural fullness, vertigo, facial weakness, or facial asymmetry. There was no antecedent ear trauma. His past medical and surgical history was otherwise unremarkable, and he was not taking any regular medication. A targeted family history disclosed that the patient's father had a long-standing unilateral left-sided preauricular pit, which had remained asymptomatic. There was no family history of congenital deafness, branchial cyst, fistula, renal anomaly, or other syndromic features suggestive of branchio-oto-renal disease. The patient's mother had

had an uncomplicated pregnancy without gestational diabetes mellitus, hypertension, or febrile illness in the relevant gestational windows.

Physical examination and clinical photography

On physical examination at the Facial Plastic Reconstructive Subdivision, the patient was alert, oriented, afebrile, and hemodynamically stable. Bilateral ear inspection revealed two small skin openings, each located immediately anterior to the ascending limb of the helix on either side, consistent with the classic anatomical variant of preauricular sinus. The opening on the right side measured approximately 1 mm in diameter and was associated with a quiescent, partially healed post-incision wound about 8 mm long extending posteroinferiorly toward the tragal region; no purulent discharge, hyperemia, edema, or fluctuance was present. The left preauricular pit was likewise approximately 1 mm in diameter, with no skin tag, no discharge, no surrounding erythema, and no palpable cyst. The external auditory canal was patent bilaterally, the tympanic membrane intact with a preserved cone-of-light reflex, and there was no preauricular or postauricular lymphadenopathy. Figure 1 illustrates the patient's six clinical photographic positions, in which the bilateral preauricular fistulae and the right post-incision drainage scar are clearly visible.

Figure 1. Six-position clinical photographs of the patient on presentation to the Facial Plastic Reconstructive Subdivision. The green arrows indicate the bilateral classic preauricular pits located immediately anterior to the ascending limb of the helix on both sides. The red arrow indicates the quiescent post-incision drainage scar over the right preauricular region performed twenty days earlier for an acute preauricular abscess.

A complete head and neck examination was then performed to exclude associated congenital anomalies that might raise the possibility of branchio-oto-renal or branchio-otic spectrum disorder. Nasal examination revealed an unobstructed bilateral nasal cavity, eutrophic inferior and middle turbinates, no septal deviation, no polyp, and no purulent or mucoid discharge. Oral cavity examination showed good dental hygiene with intact lips and palate, no cleft, no submucous defect, and a midline uvula. Pharyngeal examination demonstrated symmetric anterior pillars, calm tonsillar fossae with grade T1–T1 tonsils, and a quiescent posterior pharyngeal wall. Neck palpation disclosed no lateral cervical fistula, sinus opening, or cyst, and no thyroid, parotid, or submandibular swelling. Cranial nerve examination, including a careful assessment of the facial nerve, was entirely normal. The patient's tuning-fork tests were

symmetric and consistent with normal hearing, and a screening pure-tone audiometric assessment confirmed thresholds within normal limits bilaterally, effectively excluding a clinically significant hearing impairment of branchio-otic origin.

Preoperative laboratory and imaging workup

Laboratory and radiological investigations were obtained as part of the preoperative workup to assess fitness for general anesthesia and to exclude systemic comorbidity. Table 2 summarises the results of the haematological, biochemical, and imaging studies obtained prior to surgery. All complete blood count parameters, renal function indices, hepatic transaminases, electrolyte panel, blood glucose, and coagulation profile fell within their respective laboratory reference ranges. A posteroanterior chest radiograph showed clear lung fields with a normal cardiothoracic ratio and unremarkable pulmonary vasculature. An anaesthesiology consultation was completed and the patient was assigned an American Society of Anesthesiologists physical status classification of I, with formal clearance for elective general anesthesia.

Table 2. Preoperative laboratory and imaging investigations with reference ranges and clinical interpretation.

Investigation	Result	Reference range	Interpretation
Hemoglobin	14.6 g/dL	13.5–17.5 g/dL	Normal
Hematocrit	44%	40–52%	Normal
White blood cell count	7,800 /µL	4,000–10,000 /µL	Normal
Neutrophil %	62%	50–70%	Normal
Lymphocyte %	30%	20–40%	Normal
Platelet count	286,000 /µL	150,000–450,000 /µL	Normal
Erythrocyte sedimentation rate	8 mm/hour	0–15 mm/hour	Normal
Blood urea nitrogen	11 mg/dL	7–20 mg/dL	Normal
Serum creatinine	0.9 mg/dL	0.7–1.3 mg/dL	Normal
Aspartate aminotransferase	22 U/L	10–40 U/L	Normal
Alanine aminotransferase	26 U/L	7–56 U/L	Normal
Random blood glucose	92 mg/dL	70–140 mg/dL	Normal
Prothrombin time	12.4 s	11–13.5 s	Normal
Activated partial thromboplastin time	31 s	25–35 s	Normal
Chest radiograph (PA)	Clear lung fields, normal CTR	—	Normal
Pure-tone audiometry (screening)	Thresholds within normal limits	≤25 dB HL	Normal
ASA physical status	Class I	Class I–II = elective surgery acceptable	Fit for general anesthesia

*Notes: PA, posteroanterior; CTR, cardiothoracic ratio; ASA, American Society of Anesthesiologists; HL, hearing level; *no abnormal value was identified in this investigation panel.*

Working diagnosis and surgical decision

On the basis of the clinical history, family history, bilateral classic-type fistulae anterior to the ascending helix, recent unilateral abscess in remission, intact hearing, and the absence of any neck mass, cervical fistula, or renal symptomatology, the patient was assigned a working diagnosis of bilateral classic-type preauricular sinus with familial transmission and a remote history of right-sided preauricular abscess. The decision to proceed with definitive surgical excision was made after a multidisciplinary discussion that considered the patient's age, the documented prior infection, the bilateral nature of the disease, and the literature evidence that delayed definitive treatment carries a measurable risk of recurrent infection and progressive cicatricial complexity that can render later surgery substantially more difficult.[20,21] Given that the right preauricular wound had become clinically quiescent for twenty days and showed no residual erythema, the patient was scheduled for simultaneous bilateral preauricular sinusectomy under general anesthesia in a single-stage operative setting, an approach supported by published series demonstrating equivalent safety and patient satisfaction with combined bilateral procedures.[23,24]

Operative technique

Table 3 details the stepwise operative technique, instrumentation, and pharmacotherapeutic agents used during the bilateral sinusectomy. After standard checks of patient identity, consent, fasting status, and operative side marking, the patient was placed in the supine position with the head turned to expose the contralateral preauricular field. Routine general endotracheal anesthesia was induced and maintained according to institutional protocols. The bilateral preauricular and auricular regions were prepared with chlorhexidine-based antiseptic solution, draped in a sterile fashion, and the external auditory canals were occluded with sterile cotton-wool plugs to prevent intraoperative blood ingress.

On the right side, which had previously harboured the abscess, 1% methylene blue dye was carefully introduced into the preauricular pit using a 1 mL tuberculin syringe connected to a 24-gauge intravenous cannula sleeve, with gentle pressure to fill the tract without forcible distension. Local infiltration with lidocaine compositum 1:100,000 was then performed around the pit and along the planned incision line to provide hemostatic control. An elliptical skin incision was fashioned circumferentially around the pit using a No. 15 blade, oriented to lie within the relaxed skin tension lines of the preauricular region. Subcutaneous undermining was carried out cautiously to expose the methylene-blue-stained tract, which was traced posteriorly until its blind end was reached in the soft tissue adjacent to the previous abscess cavity. The tract demonstrated no penetration of the underlying auricular cartilage; consequently, no segment of the helical cartilage was sacrificed in this case. Surrounding granulation tissue and inflammatory cicatricial remnants from the prior abscess were curetted and excised en bloc with the sinus tract. Strict hemostasis was achieved with bipolar diathermy. A small-calibre passive drain fashioned from an 8-Fr nasogastric tube was inserted into the residual cavity and exteriorized through a separate stab incision posterior to the surgical field. The subcutaneous tissue and skin were closed in layers with Vicryl 4-0 inverted dermal sutures and Prolene 6-0 cutaneous sutures, respectively, and the wound was dressed with framycetin sulfate tulle gauze and a sterile bandage.

An identical operative sequence was then performed on the left side. Methylene blue was instilled through the pit, lidocaine compositum was infiltrated, an elliptical incision was made with a No. 15 blade, and subcutaneous undermining exposed the stained left preauricular tract. The tract was again followed to its blind termination without attachment to cartilage. Strict hemostasis was secured, an 8-Fr passive drain was placed, and the wound was closed in layers using the identical suture combination. Both surgical wounds were dressed and the patient was transferred to the recovery room in a stable condition.

Total operative time, including bilateral procedures, was approximately 95 minutes, and intraoperative blood loss was minimal (<20 mL). Figure 2 demonstrates the immediate postoperative appearance of both surgical wounds with the small-calibre passive drains in situ.

Table 3. Stepwise operative protocol for the simultaneous bilateral preauricular sinusectomy.

Step	Procedure	Materials / instrumentation
1	Supine positioning with head rotated 90° to expose contralateral preauricular field	Operating table with head support
2	General endotracheal anesthesia, secured airway	Standard anesthetic monitoring
3	Bilateral preauricular antiseptic preparation; sterile draping; occlusion of external auditory canal	Chlorhexidine-based antiseptic; sterile cotton-wool plugs
4	Methylene blue 1% instillation into pit (right side first)	1 mL tuberculin syringe + 24-gauge intravenous cannula sleeve
5	Local infiltration with lidocaine compositum 1:100,000 for hemostatic control	Lidocaine + adrenaline compositum 1:100,000
6	Elliptical skin incision around stained pit, aligned with relaxed skin tension lines	No. 15 blade
7	Subcutaneous undermining and dissection following the methylene-blue-stained tract to its blind end	Fine tenotomy scissors, fine forceps, magnifying loupe
8	Excision of tract en bloc with adjacent granulation / cicatricial tissue from previous abscess (right side)†	Bipolar diathermy for hemostasis
9	Insertion of small-calibre passive drain through separate stab incision	8-Fr nasogastric tube
10	Layered wound closure: subcutaneous Vicryl 4-0; skin Prolene 6-0	Vicryl 4-0; Prolene 6-0
11	Sterile occlusive dressing with topical framycetin sulfate tulle gauze and gauze pad	Framycetin sulfate tulle gauze; bandage
12	Identical sequence repeated on the contralateral (left) side	As above
13	Final wound inspection, secure dressing, transfer to recovery	—

Notes: †On the right side, residual scar tissue from the prior incision and drainage was included within the elliptical incision boundary; no cartilage was removed because the tract did not penetrate the helical cartilage.

Postoperative care and short-term follow-up

Table 4 summarises the postoperative pharmacotherapy regimen, the timing of the principal clinical events, and the salient observations recorded at each follow-up encounter. Immediately after surgery the patient was commenced on parenteral broad-spectrum antimicrobial therapy with ampicillin/sulbactam 1.5 g intravenously every eight hours, parenteral dexamethasone 5 mg intravenously

every eight hours for the first 24 hours to attenuate perioperative edema, parenteral ranitidine 50 mg intravenously twice daily for gastric mucosal protection during corticosteroid therapy, and parenteral ketorolac 30 mg intravenously every eight hours for analgesia.

Figure 2. Immediate postoperative appearance of both surgical wounds following bilateral sinusectomy. (A) Right ear demonstrating the closed elliptical incision over the previous pit and abscess cavity, with the 8-Fr passive drain exteriorised through a separate stab incision. (B) Left ear showing the corresponding closed elliptical incision after tract excision and primary closure.

On the first postoperative day the patient reported no surgical-site pain at rest and only mild discomfort on direct palpation. The bandages were dry without bloody soakage, the drains contained scant serosanguinous fluid, and the surgical wounds appeared calm without erythema, edema, or purulent discharge. The diagnosis was revised to bilateral status-post sinusectomy for classic-type preauricular sinus, and the existing therapeutic regimen was continued unchanged. By the third postoperative day the patient remained pain-free, the surgical wounds were clean and dry, and drain output had decreased to negligible levels; the passive drains were therefore removed on both sides. Figure 3 shows the bilateral surgical wounds on the third postoperative day after drain removal. The patient was discharged on oral clindamycin 150 mg every six hours and oral paracetamol 500 mg every eight hours for an additional five days, with instructions to maintain wound hygiene and to return for outpatient review.

Table 4. Postoperative pharmacotherapy regimen and clinical course over the 39-day follow-up period.

Postoperative day	Therapy administered	Clinical observation
Day 0 (operation day)	Ampicillin/sulbactam 1.5 g IV q8h; Dexamethasone 5 mg IV q8h; Ranitidine 50 mg IV q12h; Ketorolac 30 mg IV q8h	Stable; both surgical wounds dressed; bilateral drains in situ
Day 1	Same regimen continued	No surgical-site pain; dressings dry; scant serosanguinous drain output; no infection signs
Day 3	Same regimen; drains removed bilaterally‡	No pain; no bleeding; clean wounds; minimal drain output prior to removal (Figure 3)

Postoperative day	Therapy administered	Clinical observation
Day 3 (discharge)	Switch to oral clindamycin 150 mg q6h + paracetamol 500 mg q8h for 5 days	Discharged with wound-care instructions
Day 10 (outpatient)	Skin sutures removed	No pain, no discharge; quiescent linear scars (Figure 4)
Day 39 (outpatient)	No active medication	Mature, flat, hypopigmented scars; no recurrence; no hypertrophic change; discharged to primary care (Figure 5)

Notes: IV, intravenous; q8h, every 8 hours; q12h, every 12 hours; q6h, every 6 hours; ‡drain output had decreased to <1 mL by day 3 prior to removal. No drug-related adverse event was recorded throughout the perioperative period.

Figure 3. Bilateral surgical wounds on postoperative day three after passive drain removal. (A) Right ear and (B) Left ear demonstrating intact suture lines, mild expected periwound erythema, absence of haematoma or seroma formation, and no purulent discharge.

The patient returned to the outpatient clinic on the tenth postoperative day. He reported no surgical-site pain, no fever, no wound dehiscence, and no aural symptoms. Inspection of both surgical sites revealed quiescent, well-coapted suture lines with no swelling, hyperemia, induration, or purulent or serous discharge. The cutaneous sutures were removed in clinic without difficulty. Figure 4 demonstrates the wound appearance on the tenth postoperative day after suture removal. The diagnosis was confirmed as bilateral status-post sinusectomy for classic preauricular sinus, the patient was advised on gentle scar massage and ultraviolet light protection, and a further follow-up appointment was arranged.

Figure 4. Surgical wounds on the tenth postoperative day immediately after suture removal. (A) Right ear and (B) Left ear demonstrating fine linear scars in the planned anatomical line, with complete epithelial coverage, no dehiscence, no hypertrophic change, and no clinical evidence of residual sinus opening.

At the thirty-ninth postoperative day, the patient returned to the outpatient clinic for an interval follow-up. He continued to deny any surgical-site pain, discharge, recurrent swelling, pruritus, or aural symptoms, and he had resumed all daily activities including physical exercise without limitation. Inspection of both preauricular regions revealed mature, flat, and well-coapted linear scars without hypertrophic or keloid change, no clinical evidence of residual pit, no local hyperemia or edema, and no palpable subcutaneous cystic mass. Figure 5 illustrates the bilateral postoperative scar appearance on the thirty-ninth postoperative day. Given the satisfactory healing trajectory, absence of recurrence, and complete return of function, the patient was discharged back to the primary-level health facility for ongoing surveillance with instructions to return immediately should any swelling, discharge, or pit reappear.

Figure 5. Bilateral preauricular regions on the thirty-ninth postoperative day demonstrating mature, flat, hypopigmented linear scars without hypertrophic or keloid change, absence of residual pit, and a cosmetically acceptable healing outcome with preservation of the natural preauricular contour.

3. Discussion

The present report documents the management of a 24-year-old Indonesian Minangkabau male with familial bilateral classic-type preauricular sinus complicated by a recent right-sided preauricular abscess that was definitively treated by simultaneous bilateral single-stage sinusectomy using methylene blue tract delineation, with an uneventful short-term outcome and no recurrence at six weeks. Several aspects of this case merit detailed discussion in the context of the contemporary literature, including the epidemiological and genetic background of preauricular sinus, the embryological and histopathological substrate that determines surgical difficulty, the rationale and evidence base for the chosen operative technique, and the broader implications for postoperative care, scar surveillance, and patient counselling.

From an epidemiological perspective, the prevalence of preauricular sinus shows a remarkable geographical and ethnic gradient that is highly relevant to clinical practice in Indonesia. Yu and colleagues, in a population-based pediatric cross-sectional study of 1,106 children in British Columbia, found an overall prevalence of 2.4%, with Asians demonstrating the highest rate at 6.6%, followed by African Americans at 4.5%, Middle Easterners at 3.4%, First Nations at 2.0%, and Caucasians at only 1.2%.[5] In a Korean population-based study using the Korea National Health and Nutrition Examination Survey, An and co-workers reported a 1.3% prevalence of unilateral and 0.3% prevalence of bilateral preauricular sinus among more than 23,000 surveyed subjects, with a strong intergenerational association: the odds ratio of bilateral disease in a child was 35.7 if the father had bilateral disease and 7.7 if the mother did.[7] Comparable trends have been reported in Chinese, African, and South Asian series.[4,6] Our patient is consistent with this epidemiological pattern, being a young Asian adult with bilateral disease and a paternal preauricular pit, although the inheritance in his family was incomplete and clinically asymmetric, with the proband manifesting bilateral disease while his father carried only unilateral involvement.

The genetic architecture underlying preauricular sinus is increasingly well characterized. The condition shows an autosomal dominant inheritance pattern with reduced penetrance and variable expression, and a locus for congenital preauricular fistula has been mapped to chromosome 8q11.1–q13.3, encompassing the EYA1 gene region.[8,25] EYA1 encodes a transcriptional coactivator that interacts with SIX1 and SIX5 during otic and renal development, and pathogenic variants in any of these genes underlie branchio-oto-renal and branchio-otic syndromes, both of which prominently feature preauricular pits among their cardinal manifestations.[8,26] In our patient, the absence of hearing impairment, neck masses, fistulae, or renal symptomatology, combined with normal screening audiometry and a normal physical examination, made a syndromic association clinically unlikely. Nevertheless, several authors recommend at minimum a hearing screen and a careful systemic review in every patient with bilateral preauricular sinus, with renal ultrasound reserved for those with additional dysmorphic features, hearing loss, or a positive family history of renal disease.[8,19] We agree with this pragmatic stratified approach, which avoids over-investigation while remaining vigilant for those few patients in whom a sinus represents the visible tip of a broader developmental anomaly.

Embryologically and histopathologically, the preauricular sinus represents the consequence of failed coalescence of the auricular hillocks during the sixth week of intrauterine life. The classic-type sinus, as observed in our patient, opens immediately anterior to the ascending limb of the helix and tracks posteriorly toward the helical cartilage, often demonstrating a branched architecture deep to the skin.[1,25] In a recent histopathological analysis of 54 sinusectomy specimens, Huang and colleagues reported that the mean distance between the squamous-lined tract and the excised auricular cartilage was only 0.38 mm, with a maximum tract diameter of 0.52 cm in primary cases and 0.42 cm in recurrent cases, and that myofibroblast proliferation

was significantly more frequent in recurrent cases.[1] This intimate anatomical relationship between tract and cartilage helps to explain the historically high recurrence rate after simple sinusectomy, and underpins the modern recommendation that surgeons should be prepared to excise a small portion of the ascending helical cartilage when the tract appears to be inseparable from the perichondrium.[1,27] In our patient the dissection plane separated cleanly from the cartilage on both sides, and an additional cartilaginous excision was therefore not required.

The decision to operate on this patient was strongly influenced by the recent right-sided abscess. Although the timing of definitive surgery relative to an acute infection has been debated for decades, the contemporary literature increasingly supports either early one-stage surgery during or shortly after the acute phase, or staged definitive surgery once the inflammation has subsided. Shim and co-workers reported good outcomes with early one-stage surgical treatment of 136 infected preauricular sinuses, including 42 with frank abscess formation, with only two minor recurrences and no significant chronic complications.[22] Han and colleagues compared 36 patients operated during active infection with 176 operated after infection control using a minimal supra-auricular approach, finding no significant difference in postoperative wound erythema or recurrence between the groups, and concluded that surgery can safely be performed even during active infection in well-selected patients.[21] Conversely, several large Asian series, including the 12-year observational study by Li and colleagues of 576 patients (782 ears), have shown that the operative duration and the time to suture removal were significantly prolonged when surgery was performed during the infection period, although recurrence rates were similar.[19] In keeping with these findings, our patient was offered surgery only after the right preauricular abscess had been controlled by incision and drainage and a twenty-day quiescent interval, a strategy that allowed favourable tissue planes and a relatively bloodless dissection.

The use of intraoperative methylene blue dye to delineate the sinus tract is one of the longest-standing technical adjuncts in preauricular sinus surgery and remains widely advocated in contemporary practice. Park and colleagues recently reported a standardized sinusectomy protocol incorporating magnifying glasses, lacrimal probe exploration, methylene blue staining, and excision of surrounding normal tissue with adjacent cartilage in continuity, reducing the recurrence rate from 11.1% before standardization to 1.3% after.[28] In a large series of 208 pediatric preauricular sinuses, Gan and colleagues found low overall recurrence and complication rates with both microscope-guided and methylene-blue-and-probe-guided excision, although microscope guidance achieved a marginally lower recurrence rate.[23] In contrast, Li and co-workers found no significant effect of methylene blue use on recurrence rate in their 12-year observational cohort, but did find that the use of magnifying equipment significantly reduced recurrence.[19] Tang and colleagues reported that combining methylene blue with lacrimal probe insertion produced a significantly lower recurrence rate than methylene blue alone.[24] Taken together, the literature suggests that methylene blue is most useful as one component of a multi-modal tract identification strategy and that its principal benefit lies in revealing branches that might otherwise be transected during dissection. In our patient, methylene blue staining clearly delineated a simple non-branched tract on both sides, allowing a complete and confident excision through a comparatively small elliptical incision.

Several alternative or complementary technical strategies deserve specific mention. The supra-auricular approach, introduced by Prasad and elaborated by Manjunath, Maiti, and El-Anwar and colleagues, uses an extended incision over the temporal region and dissects the entire preauricular soft tissue en bloc down to the temporalis fascia, removing the sinus and its potential branches in continuity with a piece of adjoining helical cartilage. In a meta-analytical review by El-Anwar and ElAassar that pooled data from 17 studies and 1,270 ears, the supra-auricular approach demonstrated a recurrence

rate of 1.3% compared to 8.1% for simple sinusectomy, a statistically significant difference.[12,13,29] The inside-out technique described by Baatenburg de Jong and validated in long-term follow-up by Mottie and colleagues uses meticulous epithelial peeling from within the sinus and has been associated with a five-year Kaplan–Meier recurrence-free rate of 97.7%.[14,18] Other refinements include the trans-pit minimal incision approach of Lee and co-workers, the drain-less subcutaneous suture technique of Khardali and colleagues, the temporalis muscle fascia anchoring suture of Kim and co-workers, and the figure-of-8 incision with extended fistulectomy described by Huang and colleagues for severely infected lesions.[16,27,30,31] In our patient, the clinical context — quiescent disease without prior failed surgery, no cartilage involvement on probing, and a relatively limited inflammatory footprint — favoured a careful classical sinusectomy with methylene blue delineation, extended undermining, and primary closure, augmented by a passive drain to obliterate dead space.

Closure of the preauricular defect is another area where surgical opinion diverges. Primary closure with extensive undermining, primary closure under tension, posterior auricular transposition flaps, rotation flaps, and even cervicoparotid flaps for very large defects have all been described.[32] In our patient, the simple elliptical excision created a moderate-sized defect that closed primarily after wide undermining without tension; this strategy is supported by Akakpo and colleagues, who emphasise that more complex reconstructive options should be reserved for patients with extensive scarring from prior failed surgery or for defects that cannot be approximated without tension.[32] The decision to leave a small-calibre nasogastric-tube drain in situ for the first 72 hours was based on the principle, well articulated by Tan and colleagues and by O'Mara and Guarisco, that dead space within the residual cavity is a substrate for hematoma formation, seroma, and secondary infection, all of which predispose to recurrence.[2,33]

Table 5 places our case in context by tabulating it alongside selected published series and individual case reports of bilateral or surgically managed preauricular sinus. Compared with these series, our patient presented with several features that simultaneously support and challenge contemporary management algorithms: he was an adult rather than a child, his disease was clearly familial through the paternal line, his right side had undergone a recent infectious complication, and he insisted on simultaneous bilateral correction for personal and economic reasons. The successful outcome at six weeks is consistent with the increasing body of literature showing that single-stage simultaneous bilateral procedures can be performed safely in adults when the principles of meticulous tract delineation, complete excision of granulation tissue, dead-space obliteration, and tension-free closure are observed.

Several practical learning points emerge from this case. First, careful family-history-taking is essential in every patient with preauricular sinus, particularly when bilateral disease is present, because the documented familial pattern in our patient mirrors the increased intergenerational risk reported by An and colleagues and provides an opportunity to counsel relatives about the condition.[7] Second, prior incision and drainage of an abscess does not preclude later definitive sinusectomy through a separate elliptical incision once the inflammatory response has resolved, provided that the residual scarring is accommodated within the planned excision boundary, as also reported by Tan and co-workers in the single-incision retrograde approach.[34] Third, methylene blue remains a simple, inexpensive, and widely available adjunct that complements rather than replaces meticulous probe-guided dissection, and is particularly useful in resource-limited settings where intraoperative microscopy may be unavailable.[24] Fourth, the role of perioperative antimicrobial prophylaxis and structured analgesia in the immediate postoperative period, while not formally tested in randomised trials, appears to facilitate early discharge and uncomplicated wound healing in patients with a recent infectious history. Finally, although our six-

week follow-up is encouraging, recurrence of preauricular sinus may occur as late as four years after surgery, as documented in the long-term inside-out series of Mottie and colleagues, and ongoing surveillance through the primary care system is therefore essential.[18]

The strengths of this report include the detailed description of the surgical sequence, the clear photographic documentation across multiple postoperative timepoints, the explicit acknowledgement of the familial inheritance pattern, and the contextualisation within a comprehensive literature review of contemporary surgical techniques. The principal limitation is the relatively short follow-up of 39 days, which is insufficient to definitively exclude late recurrence; an extended follow-up of at least 12 months would be desirable and is the subject of ongoing surveillance. A second limitation is that no histopathological analysis of the excised specimen was performed in this case, which would have allowed a direct comparison with the recent histopathological findings of Huang and colleagues regarding tract diameter, cartilage proximity, and inflammatory composition.[1] In future similar cases at our institution, routine histopathological assessment will be incorporated to enrich the operative database. Finally, although the patient was Asian, of Minangkabau ethnicity, and consistent with the regional epidemiological pattern, larger series from Sumatran and Indonesian populations are needed to characterise the true prevalence, inheritance patterns, and long-term outcomes of preauricular sinus in this part of Southeast Asia.

4. Conclusion

This case report describes a 24-year-old Minangkabau Indonesian male with familial bilateral classic-type preauricular sinus complicated by a recent right-sided preauricular abscess, who was successfully managed by simultaneous single-stage bilateral sinusectomy using methylene blue tract delineation, elliptical incision, complete excision of granulation tissue, primary closure over a small-calibre passive drain, and a structured postoperative pharmacotherapeutic regimen. The patient demonstrated an uncomplicated short-term recovery with drain removal on the third postoperative day, suture removal on the tenth postoperative day, and mature, flat, cosmetically acceptable bilateral scars without recurrence or hypertrophic change at the thirty-ninth postoperative day. The combination of definitive surgery during the infection-free interval, careful intraoperative tract delineation with methylene blue, dead-space obliteration through wide undermining and passive drainage, and a single-stage bilateral approach proved feasible, safe, and patient-acceptable in this adult patient. The case underscores the importance of a thorough family history in patients with bilateral disease, a stratified screening for associated syndromic anomalies, and an evidence-anchored surgical strategy tailored to the clinical context. Continued surveillance through the primary care network remains essential to detect late recurrence, which can occur up to several years postoperatively. Familial bilateral preauricular sinus in adults can be safely managed by a single-stage operation when the principles of contemporary surgical technique are rigorously observed.

Table 5. Comparison of the present case with selected published series and case reports of preauricular sinus management.

Author (year)	Design / population	Technique highlights	Recurrence rate	Relevance to present case
Park et al. 2023[28]	Retrospective, 97 patients (120 ears)	Standardized protocol: methylene blue + lacrimal probe + cartilage excision	Standardized: 1.3%; Non-standardized: 11.1%	Validates methylene blue as a core adjunct
Bulstrode & Thacoor	Retrospective pediatric series, 10	Wide local excision after infection control	0%	Supports surgery after acute episode resolves

Author (year)	Design / population	Technique highlights	Recurrence rate	Relevance to present case
2023[17]§	patients			
Maiti et al. 2022[29]	Retrospective, 52 patients	Supra-auricular vs microscope-assisted excision	Microscope-assisted: 13.3%; Supra-auricular: 7.7%	Supports supra-auricular approach for severe cases
Han et al. 2020[21]	Retrospective, 212 patients	Minimal supra-auricular approach in active infection vs controlled	No significant difference between groups	Surgery can be performed in active infection
Khardali et al. 2020[30]	Retrospective, 198 patients (247 ears)	Standard simple elliptical incision, drain-less, subcutaneous suture	4.5% recurrence; 7.3% infection	Comparator for drain-less approach
Shim et al. 2013[22]	Retrospective, 103 patients (136 sinuses)	Early one-stage surgery in active infection	Group I 0%, II 3.8%, III 2.4%	Supports early one-stage philosophy
Gan et al. 2013[23]	Retrospective, 208 sinuses	Methylene blue + probe vs microscope	Microscope 0.9%; methylene blue 4.3%	Validates microscope superiority
Mottie et al. 2022[18]	Long-term observational, 110 patients	Inside-out technique	5-year recurrence-free 97.7%	Long-term benchmark for IO technique
Present case (2026)	Single case, adult male, familial bilateral	Simultaneous bilateral sinusectomy + methylene blue + passive drain	0% at 39-day follow-up	—

Notes: §the cohort by Bulstrode & Thacoor focused on infected paediatric preauricular sinus and used surgical excision via a wide local approach. IO, inside-out.

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