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CASE REPORT

# Anterior and Posterior Based Conchal Flaps in Extensive Acquired Auditory Canal Atresia: A Case Report and Review of Literature

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## ABSTRACT

Acquired post traumatic external meatal atresia is rare and often associated with recurrence if not properly managed. There is need to increase further success rate and minimize this morbidity with surgical techniques that proves worthwhile. The aim of this paper is to detail the step-by-step management that resulted in a satisfactory outcome while highlighting the challenges encountered. This is a case report of an acquired post traumatic left External auditory canal atresia in an adult Nigerian female that was poorly managed from the peripheral hospital where she was first attended to resulting in the acquired external atresia because of poor suturing of her lacerated left external canal. Treatment of acquired atresia remains a challenge. Using appropriate surgical technique, skin-grafting and meticulous wound/post op site care is promising in this index case.

**Keyword:** Acquired atresia, Extensive, Auditory, Anterior and posteriorly based horizontal flap

## INTRODUCTION

Acquired Auditory Canal atresia is the obliteration of the external auditory canal due to post inflammatory process replacing the epithelium by dense fibrotic tissue resulting from many aetiologic agents.[1] Acquired atresia secondary to trauma from vehicular accident is thought to be preventable by early management by the attending physician[2] The canal averages 2.5 cm in adults.[3] The lacerated canal skin therefore goes through various stages of wound healing with scar tissue formation resulting in canal occlusion of part or whole with consequent conductive hearing loss.[4] Many methods have been describe in literature but none has used the anterior and posteriorly based horizontal flap technique with modifiable option. This flap can be modified to include superior and inferior flaps depending on the need at the operation site. Acquired atresia occurs in 10% of adults[5] but the incidence is not known in Nigeria. This communication describes the management of such extensive auditory canal

atresia utilizing anterior and posterior based conchal flaps.

## CASE REPORT

AI, was a multiply injured 44-year-old house wife following a vehicular accident. She sustained laceration of left pinna, fracture of the left arm and left leg. She presented with 9 years history of left hearing loss and recurrent otalgia. She was treated for leg soft tissue sarcoma 6 years prior to presentation. The other systems were essentially normal. The patient was lost to follow up only to re-present recently for further management.

Physical examination revealed otherwise fit young lady, with left preauricular scar, obliterated left external auditory canal, left Rinne's negative and lateralization of Weber's test to the left ear. Her pack cell volume was 45%, potassium was 4 mmol/l and Ejection fraction was 80%.

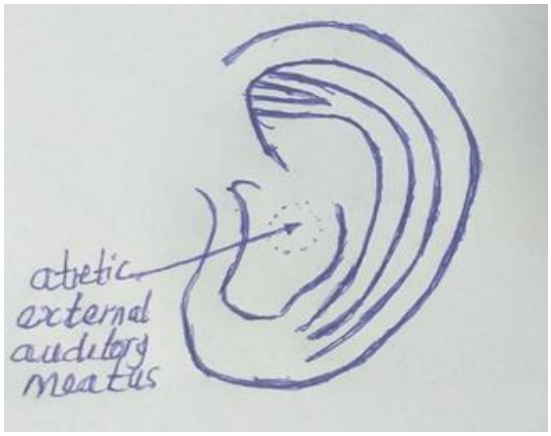

Fig.1. The point of infiltration

The Computerized tomographic (CT) scan axial view showed an extensive isodense lesion, occluding the canal from the concha through the meatus ending obliquely in anterior-posterior direction a few millimeters from the tympanic membrane.

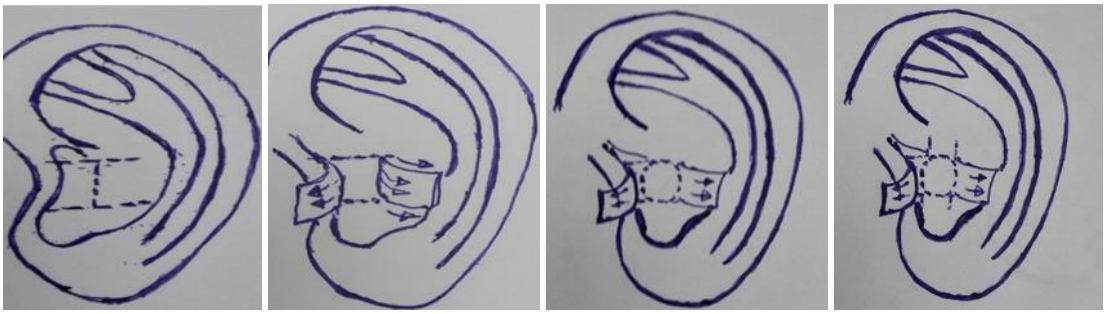
Fig.2a. Fig.2b. Fig.2c. Fig.2d.

Fig.2a. Diagram(schematic) of Horizontal incision with midpoint inter connecting incision
Fig.2b. Diagram(schematic) of elevated anterior and posterior flaps following the incision.
Fig.2c. Diagram(schematic) of marked cartilage portion (1.2 x 1.0 cm) over the external meatal opening to be excised flush with the External Auditory Canal.
Fig. 2d. Modifiable to superior and inferior flaps if needed.


Fig.3. Fig.4. Fig.5. Fig.6.

Fig.3. The harvested skin sites.
Fig.4. The Canal lined skin 4$^{th}$ day post op with some skin graft loss towards the EAC.
Fig.5. The Canal lined skin 14$^{th}$ day post regrafting showing complete graft take.
Fig.6. The completely healed canal with Gentian violet stain.

The patient was intubated under general anaesthesia with the head rotated so that the left ear was upwards and stabilized on head ring. Routine cleaning with povidone iodine 10% was done, the post auricular region was infiltrated with 1% lignocaine and adrenaline in 1:50,000 dilution for about 5 minutes. The draping was performed with 4 towels each to leave a square space round the ear. The skin over the atretic meatus was infiltrated parallel to the upper and lower border of the obliterated external meatus such that the proposed skin incision makes a tangent to both upper and lower border of the meatus. Also, a midpoint infiltration connecting these two lines was carried out. (Figure.1). Thereafter, skin incisions were made parallel to each other up to the depth of the perichondral layer as well as the interconnecting skin midway such that an anterior and posterior based conchal horizontal flaps resulted using loop of x 4 magnification (Rose Micro Solutions-Rose 2x-L Cє). A C-shaped skin incision was made down to the periosteum at post auricular area and an anteriorly based flap was raised and elevated until the spine of Henle. Returning back to the lateral surface, a Neomeatus, a circular shaped cartilage of 1.2 by 1.0 cm was made and cored down to the level of the bony meatus. Posteriorly, her circular cartilage was transected flush with the external auditory canal. Using the circular Knife, the fibrotic tissue filling the whole external meatus was removed leaving the entire canal all bare. A canaloplasty was performed to widen the whole canal using high speed drill, leveling the anterior bulge until the whole of the annulus of tympanic membrane was visualized. A wide meatoplasty was performed with incision at 12 o'clock and 4 o'clock through the soft tissue, the conchal cartilage via the post auricular incision in such a way that only the inner skin was spared as the surgeon moves outwardly.

These incisions resulted in conchal flap that was anchored with stitches superiorly; at the midpoint and inferiorly to the post auricular skin to widen the meatus. The anterior and posteriorly based flaps were sutured as far back as possible into the posterior canal wall but with the stitches tied outside such that the bare areas of the medial two third of the canal and the roof and floor of the meatus were left uncovered. A partial thickness skin graft was harvested from the upper arm and the bare areas were skin grafted and held in place with gel foam. On the 4th day, the gel foam was removed and one of the small pieces of skin graft got dislodged. Immediately, external auditory canal packing with 10% povidone iodine was commenced on alternate days until the 10th day when, it was noticed that there was good granulation tissue over some bare areas. The patient was then sedated, the raw area was again skin grafted with free hand split thickness graft and this time merocele was inserted to hold the graft in place for another 4 days, following which the patient was discharged home with alternate dressing and by the 27th day the canal was completely covered with skin graft and left open and successfully recanalized. Post operatively, she was commenced on intravenous Ciprofloxacin 200mg 12 hourly for 48 hours and subsequently commenced on Tab Ciprofloxacin 500mg 12hrly for one week; instillation of 3 drops of 2% Ciprofloxacin ear drops daily for one week. She also had parenteral Paracetamol 600mg 8 hourly for 48 hours followed by Tab Paracetamol 1 g 8 hourly for 5 days.

## DISCUSSIONS

Delay in referral of Acquired external auditory canal for appropriate management results in varying degrees of canal atresia from lateral to medial.[6] Atresia, then presents clinically in various forms. It may present with history of trauma, otorhoea, conductive hearing loss and cosmetic defect as well as Cholesteatoma.[1] Rinne's test was negative with 512 Hz Tunning fork. (BC>AC).[7]

The role of CT scan of the petro-mastoid bone cannot be de-emphasized in determining the extent of the atresia or the entire anatomy.[8] Bajin et al[6] used Schuller and Towne radiological views of plain X-ray due to inaccessibility of CT scan. In our case the soft tissue canal occlusion was greater than two third of the length of the external auditory canal from lateral to medial, (Fig.2). A good understanding of temporal bone anatomy and temporal bone dissection readily equips the surgeon with the necessary task to undertake this procedure.[9] The questions to ask will include: what type of incision to be used; will the procedure entail only a meatoplasty, meatocanalplasty or

tympanoplasty with or without ossicular chain reconstruction.[4,6]

Various meatal incisions have been used by different Otolaryngologist.[10-14] Incisions should be good enough to cover the extent of the surgery.[15,16] In this index case, two perpendicular horizontal incisions with interconnecting incision at the midpoint were used, flaps were reflected anteriorly and posteriorly to give enough access to the cartilage that will be excised measuring about 1.2 cm by 1.0 cm in (Vertical by Horizontal) direction. This was excised down to the external meatal opening, (Figs. 2 and 3). This incision differs from the Z-plasty incision with slanty edge by Fagan[11] in South Africa which may make canal grafting edge a bit challenging while placing a skin graft when dealing with extensive raw canal area. The rest of the procedure was as described by Faramarz et al.[15]

The meatoplasty is necessary because adequacy of the size determines whether the granulation tissues will re-occlude the canal or not.[17] The anchoring stitches hold back the posterior flap in other to keep the external meatus opened.[16] This was similar to that described by Faramarz.[15] The next challenge was how to hold the skin graft in place and how long will the packing stay before changing the first packing.[18] In this case, there was a little challenge because some of the canal skin grafts got dislodged while removing the initial gel foam used for packing the canal requiring a second graft to completely re-epithelize the raw surface to prevent healing by secondary intention.[6] Evans et al[19] used Acellular Dermal Matrix instead of split thickness skin graft and obtained similar result. In our case, we used split thickness skin graft in spite of possibility of necrosis like Droessaert et al[4], others used both split thickness and full thickness skin graft.[6] It is worthy of note that while Droessaert et al[4] used electrical dermatome for the graft harvest, we harvested our graft using free hand technique with surgical blade no.22.

Canaloplasty was done to create a good and wider view of the canal up to the tympanic annulus by removing the anterior bulge. It also provided the floor for the skin graft. Removal of the anterior bulge may injure the temporomandibular joint however placing temporalis fascia over the joint before the skin graft can readily correct it.[20]

There is need to follow up this type of patients closely for at least the first 6 months to ensure the canal remains patent but however the patient has been followed up for 2 years now without recurrence. In our case, we packed the ears with gauze soaked in 10% povidone iodine to flatten the granulation tissues and we applied skin graft under sedation to completely eliminate further bare areas and finally applied Gentian violet to encourage re-epithelialization. Some Authors used Silicon sheets, antibiotic ointments (Tera Cortril) for about 2 weeks while others used silastic sheet, gelfoam, antibiotic soaked gauze and Bismuth Iodine Paraffin Paste.[1,4]

**Conclusions:** Treatment of acquired atresia remains a challenge. Using appropriate surgical technique, skin-grafting and meticulous wound/post op site care is promising in this index case.

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