

Postoperative Mastoid Fistulas Managed by Fistulous Tract Excision and Cavity Obliteration by Epicranial Aponeurosis & Temporalis Fibromuscular Flaps

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ABSTRACT: OBJECTIVE: Discharge free mastoid cavity with good healing is the aim of all canal wall down (CWD) procedures. Post aural fistulas after CWD mastoidectomies can be successfully treated by fistula tract excision and obliterating the mastoid cavity. SETTING: Department of ENT, Head & Neck Surgery, KVG Medical College, Hospital, Sullia, Karnataka, India. CASE REPORTS: 3 cases of post CWD mastoid fistulas which were discharging were taken for fistula excision and cavity obliteration under general anaesthesia. RESULTS: All 3 cavities and fistulas were obliterated by scalp epicranial aponeurosis and temporalis fibromuscular flaps. In one case these flaps were augmented by fascia lata. CONCLUSION: Post aural mastoid fistula resulting from complications of CWD mastoidectomies can be treated successfully by fistula excision and cavity obliteration by combined epicranial aponeurosis and muscle pedicled flaps.

Key Words: Mastoid fistula, Cavity obliteration, Temporalis fibro muscular flap, Canal wall down technique, Epicranial aponeurosis flap.

INTRODUCTION: Post aural mastoid fistula can occur as a complication of unsafe type of CSOM or a canal wall down tympano-mastoidectomy^{1,2}. Simple skin to skin closure of the scarred fistula often is not successful as it may end up in a larger fistula due to its necrotic edges¹. The long term results depend on the technique of obliteration of the mastoid cavity². Well healed and discharge free mastoid cavity is the end result of all canal wall down mastoidectomies³. The surgical techniques which are meticulously needed to ensure complete mastoid cavity healing include complete disease clearance, adequate lowering of the facial ridge, good meatoplasty and closure of the perforation of the tympanic membrane³. The incidence of discharging mastoid cavity after a canal wall down (CWD) procedure is between 10-66%^{4,5}. This technique of open cavity mastoidectomy carries the potential of unhealed cavity resulting in chronically discharging ear^{4,5}. So various methods practiced to enhance healing after CWD procedure include partial or complete obliteration of the mastoid cavity⁶. The surface of the mastoid cavity derives its vascularity and nutrition from the bare bone surface and the obliteration of the cavity using vascular tissue flaps aids in this process⁶. At the end of the CWD procedure the cavity is polished with diamond bur which smoothens the cavity but devascularises it compromising its epithelial regeneration⁷. Size of the discharging surface decreases drastically after cavity obliteration and the epithelial regeneration of the remaining surface are fastened if vascular pedicled graft is used⁷. Recurrent cholesteatomas are identified with difficulty in an obliterated cavity and preferred only after complete disease clearance⁷. The main idea is to decrease the size of the mastoid cavity which leads to better healing

of the cavity due to good vascularity³. The rate of healing of the cavity becomes faster after obliteration³. The main disadvantage of cavity obliteration is failure of early detection of cholesteatoma recurrence and a remote risk of intracranial complications³. Pure tone audiometric analysis documented no increase in hearing in cavity obliterated patients compared to non obliterated patients³.

CASE REPORTS: *Case 1:* The patient was a 49 year old male and had CWD mastoidectomy done 21 years earlier and had a left sided postaural mastoid fistula.

The meatoplasty opening was closed and endoscopic examination of the mastoid cavity through the fistula showed recurrent flakes of cholesteatoma.

Case 2: The patient was a 37 year old male and had CWD mastoidectomy done 6 years back and had a right sided postaural mastoid fistula. The meatoplasty



Figure 1: Post aural mastoid fistula left sided.



Figure 2: X-ray of post operated CWD cavity.

opening was narrowed and recurrence of cholesteatoma seen.

Case 3: The patient was a 42 year old male and had CWD mastoidectomy done 12 years earlier and had a left sided postaural mastoid fistula. Here the meatoplasty was completely closed with the fistula discharging.

RESULTS: All the 3 patients were given antibiotics and discharged on the third day. Meatoplasty and the obliterated cavity were observed on follow up. The fistula healed very well after scar excision. The discharging cavity reduced in size and recurrence of cholesteatoma was not seen on 12 months of follow up.

DISCUSSION: The main objectives of mastoid surgeries are complete disease clearance and reconstruction of the hearing mechanism and to prevent recurrence^{8,9}. Mastoidectomy procedures are divided into two types depending on whether the posterior canal wall is kept intact or removed¹⁰. In canal wall down mastoidectomy (CWD) posterior canal wall is removed and in intact canal wall (ICW) mastoidectomy posterior canal wall is kept intact¹⁰. Recurrence of cholesteatoma is usually due to incomplete disease removal during surgery from the middle ear¹¹. Factors well known in causing recurrence in canal wall down procedures include inadequate meatoplasty, a high facial ridge, inadequate diseased air cells clearance and failure to exenterate hidden cholesteatoma fragments completely¹². The suppuration in the remaining tissues and obstructive mechanical factors enhances the accumulation of the debris in the cavity causing discharge¹³. Thus, incomplete disease clearance during mastoidectomy has been recognized as a common cause of failure in patients, with or without cholesteatoma^{13,14}. The incidences of recurrent cholesteatoma are seen in 21-25% of cases post operatively¹¹. Recurrent cholesteatomas are more aggressive in pediatric population than in adults^{10,15}. To avoid cavity problems even in unsafe CSOM with small cholesteatomas ICW mastoidectomy is preferred after complete disease

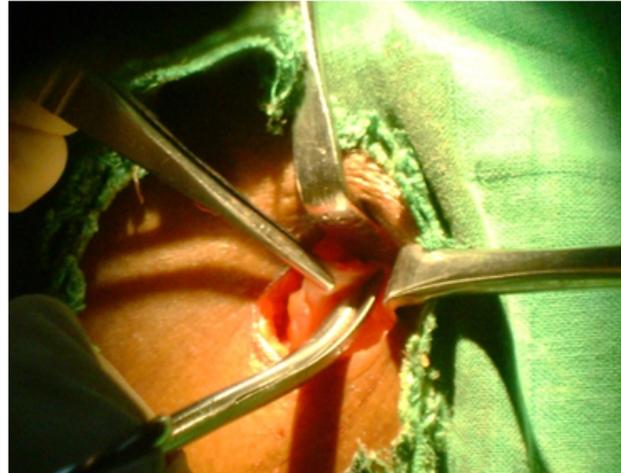


Figure 3: Fascia lata being harvested to augment the flaps.

clearance⁹. The incidences of recurrent cholesteatomas are higher in ICW procedures compared to CWD procedures done for unsafe CSOM⁹. Normal canal wall, middle ear anatomy and functions are maintained in ICW procedures but still the remnant squamous epithelium left over during surgery due to poor visibility or technique may lead to recurrence^{16,17}. The creation of an open cavity with CWD procedure which includes wide meatoplasty reducing future risk of post surgical cholesteatomas causing complications as it can be inspected easily¹¹. Relapses in the mastoid cavity can be prevented but residual cholesteatoma in the middle ear should be re-explored to prevent complications¹¹. The CWD technique is more difficult to perform earlier during the disease process¹⁵. The disadvantages associated with CWD mastoidectomy include life long mastoid care and the possible recurrence of discharge¹⁵. Because post surgical cholesteatomas originate from the epitympanum, they usually are found in the attic or pars flaccida¹⁴. Recurrent cholesteatomas should be evaluated by a careful medical history, otomicroscopy and CT Scan of both the mastoids¹⁴. CT appreciates the bony changes and the soft tissue densities within the mastoid and the middle ear¹⁴. On diagnosing the recurrent cholesteatoma treatment goal should be to remove the matrix completely and repair any relevant structures to prevent damage to the ossicles and tympanic membrane and to prevent further recurrence¹⁴. The surgical technique of CWD mastoidectomy depends on the extent of the cholesteatoma of the ear, the amount of pre-operative destruction and the extent of mastoid pneumatization¹⁴. The problems of the discharging mastoid cavity can be reduced by obliterating the cavity and also closing the fistula from above and re-enforcing it from below¹⁸. Several methods of cavity obliteration are proposed¹⁸. Many methods used include free and pedicled skin grafts¹⁸, temporalis muscle flaps, bone chips, bone pate, cartilage grafts, non absorbable synthetic substances, ceramic powder and autologous cultured epithelial cells³. Skin grafts used split thickness and pedicled

grafts failed in most of the cases as they necrosed and sloughed off resulting in persistently discharging cavity⁴. Bone grafts were proved unsuccessful because complete absorption of the grafts and problems at the donor site⁴. These two grafts failed because the lack of adequate vascularity within the cavity prevents the integration of the grafts⁴.

Dermo-adipose tissues used to fill the cavity failed to heal the cavity as they became incompatible on crushing and harvesting a huge amount was a problem^{4,18}. The musculo-periosteal flap and pedicled temporalis muscle flaps gave good results in the initial months but later shrank in size due to disuse atrophy resulting in partial formation of the mastoid cavity^{18,19}. The flaps of the superficial and deep fascia of the scalp which includes epicranial aponeurosis and loose areolar tissue are also used to obliterate the CWD cavity because of the rich vascularity of the scalp²⁰. The subaponeurotic layer can be used alone or along with the pedicled temporalis muscle flaps depending on the desired thickness of the flap²⁰. The scalp flaps are supplied by superficial temporal and posterior auricular arteries²⁰. The use of epicranial aponeurosis can be folded upon itself or with muscle flaps gives very good results on obliteration of CWD mastoid cavity²⁰.

The post-auricular scar for cavity obliteration is more posterior compared to the initial mastoidectomy scar but is hidden among the hair and chances of alopecia is remote as dissection is done meticulously while harvesting the flaps¹. We used epicranial aponeurosis with pedicled temporalis muscle flap in the 3 cases of post CWD mastoid fistula³. The steps include postaural incision, excision of the fistulous tract, complete saucerization of the cavity and reducing the facial ridge. Later a wide meatoplasty with conchal cartilage excision is done³. Now the aponeurosis flaps are harvested and rotated along with temporalis muscle pedicled flap³. In one case the flaps were augmented with fascia lata. The muscle and fascial grafts shrink and forms a fibrous coating which supports the growth of epithelium from the edges³. The patients were discharged on 3rd day with antibiotics prescribed for three weeks. The patients were followed up for 6-12 months and all the three showed good fistula healing with drastically reduced cavity discharge on meatoplasty examination.

CONCLUSION: Post aural mastoid fistula resulting as complications of CWD mastoidectomies can be treated successfully by combined aponeurosis flaps and muscle pedicled flaps. These flaps are safe, well vascularized, malleable and easily adaptable to the bone cavity. The complications and morbidity are minimal on follow up. Long term results are good with good fistula healing and reduced cavity problems.

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