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"Countersinking" of reservoir in an irradiated patients can decrease tension on scalp closure

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Abstract

Background: Subcutaneous reservoirs are used to provide therapy by establishing access to cerebrospinal fluid. However, it is associated with complications such as hemorrhage, infection, malfunction, and malpositioning. In an irradiated field with thin skin, use of reservoir can result in wound dehiscence, wound infection, and device extrusion.

Case Description: We introduced a "countersinking" technique for the reservoir placement which involves the creation of bony recess in the skull to effectively accommodate the reservoir and decrease the protrusion. "Countersinking" of the reservoir can result in tension-free closure of the scalp and allow durable coverage of the reservoir. In the representative case, the incisional wound healed completely without any concern for wound dehiscence and the countersink technique may have contributed to effective healing of the radiated scalp.

Conclusion: Countersinking of the reservoir can be a strategy to prevent complications such as wound dehiscence, and device extrusion in any patient, but in irradiated patients with very thin skin it also enables tension-free closure of the wound.

Key Words: Countersinking, ommaya reservoir, wound dehiscence

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INTRODUCTION

Subcutaneous reservoirs such as ommaya reservoir are used to administer intraventricular antibiotics for chronic meningitis, intrathecal chemotherapy for central nervous system lymphoma, and aspirate fluids from cystic tumors.[2,5,10,13,14] However, their use is associated with a complications such as hemorrhage, malfunction, and misplacement.[3,7-9,11,12] Placement of a protruding device underneath a thin irradiated skin can exert increased tension on the already weakened wound and result in wound dehiscence and wound infection.[1,4,6] We propose a "countersinking" technique of reservoir placement which creates a tailored bony recess to accommodate the reservoir [Figure 1].

CASE REPORT

The patient was a 46-year-old woman who underwent right frontal craniotomy in1998 for tumor resection. Pathology was consistent with astrocytoma requiring adjuvant chemoradiation therapy. Her follow-up

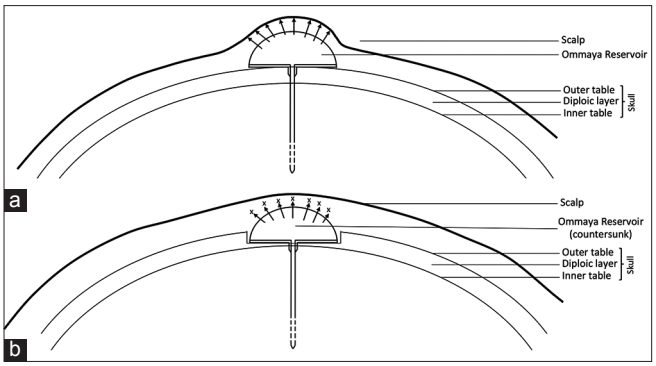

Figure 1: Protrusion of the reservoir increases the tension on the overlying wound (a) while countersinking of the reservoir between the outer and inner table of the skin bone (b) promotes tension-free wound closure. This technique facilitates wound healing prevents complications such as wound dehiscence

magnetic resonance imaging in 2012 showed interval cyst enlargement in the right frontal lobe. A plan was made to proceed with aspiration of the cyst contents and then leave a catheter into the cavity which would then be connected to a reservoir for access in case the cyst reaccumulates.

Due to the history of radiation and very thin skin, there was a significant concern for wound breakdown and a modified technique was used for reservoir placement. A U-shaped incision was made adjacent to the previous incision outside the borders of the radiated skin and a pericranial flap was then raised. The skull bone was drilled through the outer table and the diploic layer to the level of the inner table to provide a tailored bony recess for countersinking the reservoir in the skull so that it would not protrude. The BrainLab navigation system was used to establish the oblique trajectory of the catheter. The dura was opened and the catheter was passed into the cyst. About 20 ml of yellowish thick fluid was aspirated and sent to cytology. The catheter was then secured to the reservoir which was effectively countersunk in the bony recess. The patient had no complications from the reservoir placement at 2 months follow-up appointment.

CONCLUSION

Subcutaneous reservoirs provide an effective way of establishing external access to cerebrospinal fluid (CSF) and other intracranial fluid spaces.[2,5] However, technical complications in the form of malpositioning and infectious complications leading to meningitis can be life threatening.[7] Placement of a reservoir in an irradiated wound with thin skin increases the risk of wound dehiscence and device extrusion. With wound dehiscence, a superficial wound infection can easily track to the CSF and intracranial cavity resulting in serious intracranial complications. Any technical modification toward preventing such potential complications would have far reaching consequences.

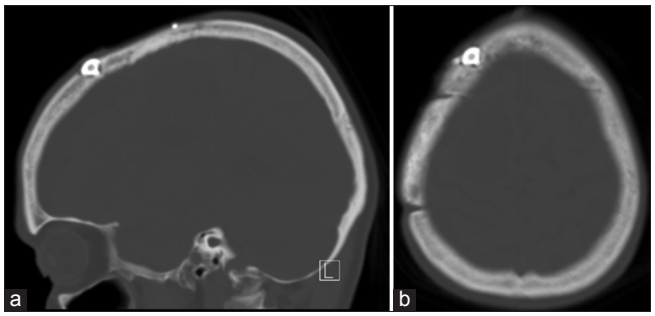

Figure 2: Coronal (a) and axial (b) section of computed tomography scan demonstrating the placement of the ommayma reservoir in the bony recess of the skull through the outer table and the diploic layer up to the inner table

In our patient, there was a high risk of wound dehiscence and reservoir extrusion given the thin irradiated skin. Countersinking of the reservoir into the bone decreases the protuberance and by doing so, minimizes the stretching of the overlying skin [Figure 2]. This simple modification decreases the risk of wound dehiscence and device extrusion. It also results in effective "soft tissue lengthening" and allows a tension free closure. We used an oblique trajectory, facilitated by neuronavigation and a tracked stylet for catheter placement, to ensure that the incision is outside the boundaries of previous radiation and the reservoir is not directly underneath the incision.

Since a large number of brain tumor patients require chemoradiation and these patients often have significant other co-morbidities resulting in poor wound healing, the "countersinking" of the reservoir can potentially prevent the risk wound dehiscence and device extrusion in these patients and enable tension free intra-operative closure of the wound.

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