Original Research

# THE SURGICAL CHALLENGE OF HIGH-RIDING JUGULAR BULB IN ASSOCIATION WITH KERATOSIS OBTURANS: A CASE REPORT

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## ABSTRACT

High-riding jugular bulb (HRJB) is an uncommon vascular anomaly of the temporal bone that may pose a significant risk during otologic surgery. Keratosis obturans (KO), characterized by accumulation of desquamated keratin within the external auditory canal, can occasionally coexist with middle ear and temporal bone anomalies, complicating surgical management. We report a rare case of keratosis obturans associated with a high-riding jugular bulb encountered intraoperatively during canal clearance. The patient presented with conductive hearing loss, otalgia, and chronic ear discharge. Routine laboratory investigations were within normal limits. High-resolution computed tomography (HRCT) of the temporal bone showed soft tissue opacification involving the middle ear cavity and mastoid air cells on the right side with hypopneumatization suggestive of otomastoiditis. The left ear demonstrated a small polypoidal mucosal thickening involving the tympanic membrane, likely representing keratosis obturans, without expansion of the bony canal. Imaging also revealed a high-riding jugular bulb. Surgical clearance was performed with meticulous dissection to avoid vascular injury and catastrophic hemorrhage. Histopathological examination confirmed keratosis obturans. Awareness of this anatomical variation and careful preoperative radiological evaluation are essential for safe surgical intervention. This case highlights the importance of recognizing HRJB as a potential surgical hazard in patients with keratosis obturans.[1–3]

**Keywords:** High-Riding Jugular Bulb, Keratosis Obturans, Temporal Bone, Conductive Hearing Loss, Otologic Surgery, Venous Anomaly.

## INTRODUCTION

Keratosis obturans is a rare condition of the external auditory canal characterized by the accumulation of desquamated keratin debris, leading to canal obstruction, severe otalgia, and conductive hearing loss[1].

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Unlike external auditory canal cholesteatoma, keratosis obturans is associated with generalized widening of the external auditory canal without focal osteonecrosis[2]. Surgical debridement is often required when conservative treatment fails or when extensive disease is present.

The jugular bulb is formed by the continuation of the sigmoid sinus into the internal jugular vein at the skull base and is situated within the jugular fossa beneath the middle ear cavity[3].Anatomical variations in the position and size of the jugular bulb are common. Among these, high-riding jugular bulb (HRJB) and dehiscent jugular bulb are of particular clinical importance. HRJB is generally defined as superior extension of the jugular bulb above the

normal anatomical level, reaching the floor of the middle ear cavity, basal turn of the cochlea, or inferior margin of the tympanic annulus[4–6].

The clinical significance of HRJB lies primarily in its close anatomical relationship to the hypotympanum and middle ear structures. During otologic surgery, inadvertent injury to an unrecognized HRJB can result in sudden profuse venous hemorrhage, obscuring the operative field and potentially causing life-threatening complications[7]. In addition, HRJB may complicate access to the round window niche during cochlear implantation and other middle ear procedures[8].

Apart from surgical implications, HRJB has been associated with conductive hearing loss, sensorineural hearing loss, pulsatile tinnitus, vertigo, and Ménière-like symptoms[9]. Conductive hearing loss may result from direct contact of the jugular bulb with the tympanic membrane, ossicular chain, or round window membrane. Sensorineural hearing loss may occur secondary to compression of adjacent labyrinthine structures such as the vestibular aqueduct[10]. Radiologically, HRJB can mimic vascular middle ear tumors such as glomustympanicum or glomusjugulare, particularly when associated with bony dehiscence[11]. Therefore, careful radiological evaluation with HRCT is essential before otologic surgery to identify vascular anomalies and prevent intraoperative complications[12].

The coexistence of keratosis obturans with HRJB is extremely uncommon and poses unique diagnostic and surgical challenges. We present a rare case in which detailed preoperative imaging and cautious surgical planning enabled safe management without vascular injury.

**Case Report**

A 24-year-old female presented to the otorhinolaryngology outpatient department with complaints of intermittent bilateral ear discharge since childhood and decreased hearing for several months, associated with occasional otalgia. There was no history of vertigo, tinnitus, trauma, or previous ear surgery. Otoscopic examination revealed otomycotic debris in the right ear, whereas the left ear showed a medium-sized central perforation with keratinous debris [Figure 1].

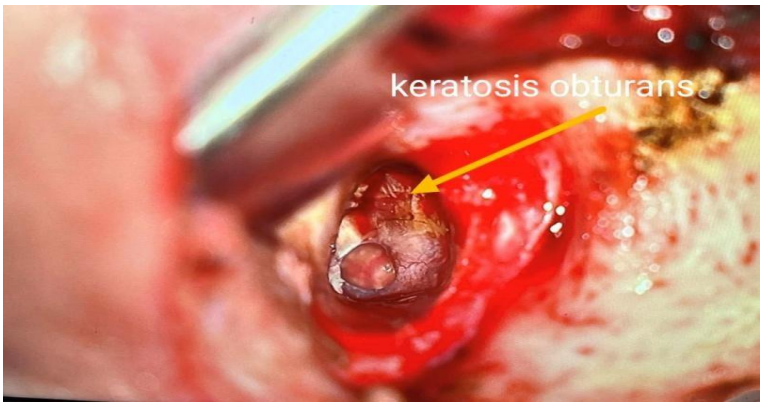


Figure 1 –Microscopic Picture Showing Central Perforation in Tympanic Membrane with Keratosis Obturans

Routine hematological and biochemical investigations were within normal limits. HRCT of the temporal bone demonstrated soft tissue opacification involving the right middle ear cavity and mastoid air cells were sclerotic suggestive of otomastoiditis. The left ear showed small polypoidal mucosal thickening involving the tympanic membrane, likely representing keratosis obturans, without significant expansion of the bony canal. A high-riding jugular bulb was also identified preoperatively [Figure 2].

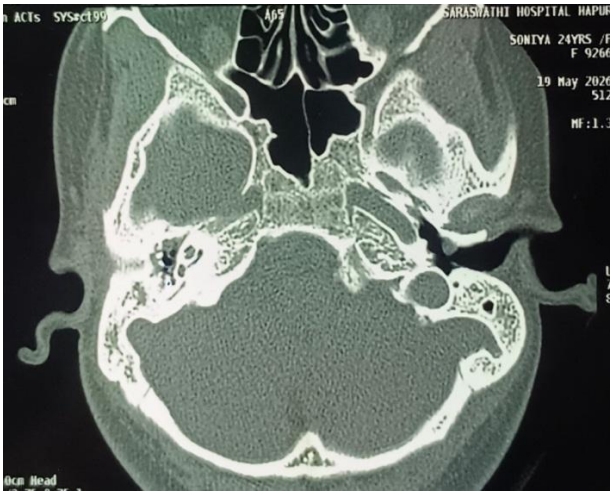


Figure 2 – Hrct Scan Temporal Bone Showing High Riding Jugular Bulb with Features of Otomastoiditis

The patient underwent surgery for the left ear first because hearing loss was more pronounced on that side. A cortical mastoidectomy was initially performed, followed by elevation of the tympanomeatal flap for middle ear exploration. Intraoperatively, a high-riding jugular bulb occupying the hypotympanic region was identified [Figure 3]**.** Keratin debris was noted within the external auditory canal and was carefully removed.

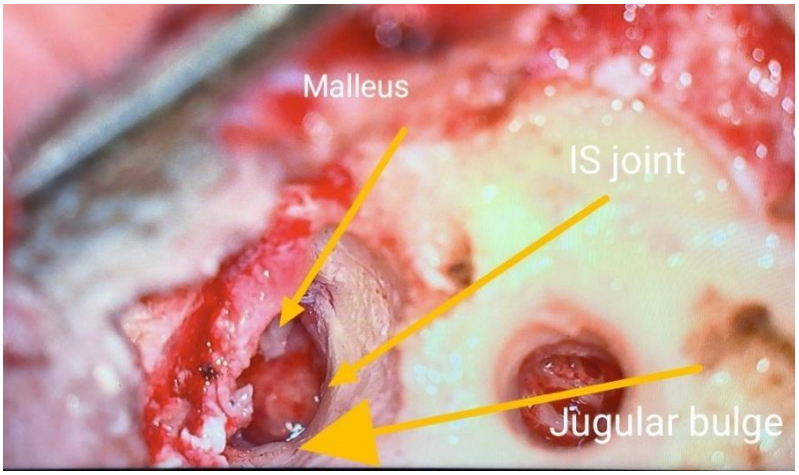


Figure 3 – Intraoperative Picture Showing Jugular Bulge and the Ossicles

Although the jugular bulb was positioned unusually high, no evidence of bony dehiscence was observed. The ossicular chain was intact. Tympanic membrane reconstruction was performed using temporalis fascia graft placed medial to the handle of the malleus, supported by a thin cartilage graft. The procedure was completed uneventfully without vascular injury or significant bleeding.

The specimen was sent for histopathological examination, which confirmed keratosisobturans [Figure 4].

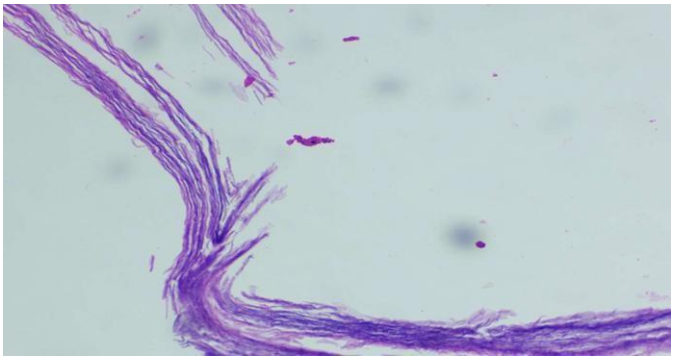

Figure 4 – Microphotograph Showing Fragments of Keratinous Flakes

The postoperative period was uneventful, and the patient demonstrated improvement in hearing. Follow-up at three months revealed a healthy ear canal and intact graft without evidence of recurrence.

## DISCUSSION

Keratosis obturans is characterized by abnormal accumulation of keratin within the external auditory canal due to defective epithelial migration and abnormal desquamation[13] .Chronic inflammation and recurrent infections may contribute to disease progression. Clinically, patients often present with severe otalgia and conductive hearing loss, which help differentiate the condition from external auditory canal cholesteatoma[14].

HRCT is considered the imaging modality of choice for diagnosing keratosis obturans and distinguishing it from external auditory canal cholesteatoma or neoplastic lesions[15]. In the present case, HRCT not only identified keratinous disease but also detected the associated HRJB, thereby significantly influencing surgical planning.

The jugular bulb demonstrates substantial anatomical variation in its size and location. A high-riding jugular bulb occurs when the bulb extends superiorly into the hypotympanic region[4]. In some patients, the thin bony plate separating the jugular bulb from the middle ear cavity may be absent, producing a dehiscent jugular bulb that is particularly vulnerable to injury during surgery[5].

Most HRJBs are asymptomatic and discovered incidentally during imaging studies. However, depending on the extent of upward extension, patients may experience conductive hearing loss, pulsatile tinnitus, vertigo, or sensorineural hearing impairment[9]. Conductive hearing loss may result from mechanical interference with ossicular movement or contact with the tympanic membrane and round window membrane[10, 17, 19].

The coexistence of keratosis obturans and HRJB is rare and creates significant operative challenges. Accumulated keratin debris may obscure the anatomy of the inferior canal wall and hypotympanum, increasing the risk of inadvertent injury to the jugular bulb during surgical clearance. Injury to a dehiscent jugular bulb may result in torrential venous hemorrhage, obscuring the surgical field and complicating operative management[7].

Preoperative identification of HRJB is therefore critical in all patients undergoing otologic surgery. HRCT helps delineate the relationship of the jugular bulb to surrounding structures and alerts the surgeon to the possibility of vascular anomalies[12]. Recognition of HRJB allows modification of the surgical approach and avoidance of excessive curettage or drilling in the hypotympanic region.

Meticulous surgical technique is essential in such cases. Gentle dissection under microscopic visualization and cautious removal of keratin debris can prevent vascular injury. If bleeding from the jugular bulb occurs, immediate control using surgicel, gelatin sponge packing, muscle grafts, and controlled hypotension may be necessary[7].

Differentiation between keratosis obturans and external auditory canal cholesteatoma is another important aspect of management. Although both conditions involve keratin accumulation, external auditory canal cholesteatoma is associated with localized bone destruction and requires more aggressive surgical treatment[14].Histopathological examination may assist in confirming the diagnosis when clinical findings are inconclusive.

Long-term follow-up is necessary because keratosis obturans has a tendency to recur. Periodic otoscopic examination and aural toileting may be required to maintain canal patency and prevent recurrent keratin accumulation[16].

This case emphasizes the importance of careful radiological assessment, anatomical awareness, and meticulous surgical planning when managing otologic disease associated with vascular anomalies[18,19]. Early recognition of HRJB can significantly reduce the risk of life-threatening intraoperative complications and improve surgical outcomes.

## CONCLUSION

High-riding jugular bulb associated with keratosis obturans is a rare but surgically important entity. Preoperative HRCT evaluation plays a crucial role in identifying vascular anomalies and reducing intraoperative risk. Otologic surgeons should maintain a high index of suspicion for HRJB when operating near the hypotympanum or inferior canal wall. Careful surgical technique and thorough anatomical knowledge are essential for safe and successful management.

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**AK**- Definition of intellectual content, Literature survey, Prepared first draft of manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation; **GS**- Concept, design, clinical protocol, data collection; **TDK**- Design of study, manuscript preparation; **NA**- Manuscript editing, review and article submission;

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