Scholix Publishers

International Surgery and Case Reports

Volume 1 issue 6 2026

Open Access

Review Article

High-Resolution Computed Tomography of the Temporal Bone in Endoscopic Ear Surgery: Clinical Applications and Surgical Implications.

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Received date: 06-Nov-2026
Accepted date: 21-Nov-2026
Published date: 22-Nov-2026

Citation: Pankaj Goyal, Consultant E.N.T. and Head & Neck surgeon, Apollo ENT hospital, Jodhpur, Rajasthan, India. (2026). High-Resolution Computed Tomography of the Temporal Bone in Endoscopic Ear Surgery: Clinical Applications and Surgical Implications.

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ABSTRACT

Background: Endoscopic ear surgery (EES) has increasingly gained preference for addressing middle ear disorders owing to its capacity to provide an extensive view of the middle ear and to uncover structurally hidden niches. High-resolution computed tomography (HRCT) of the temporal bone is essential for preoperative evaluation since it delineates anatomical structures, assesses disease extent, and identifies potential surgical hazards.

Objective: To assess the importance of HRCT of the temporal bone in preoperative assessment, surgical planning, disease identification, and complication preventive measures in endoscopic ear surgery.

Methods: This review of literature compiles current knowledge on temporal bone imaging, the assessment of cholesteatoma, the correlation between radiological results and surgical results, and the feasibility of trans canal endoscopic ear surgery. Relevant studies were identified using PubMed-indexed articles and contemporary radiological practice recommendations. The evaluation highlights the clinical significance and limitations of HRCT in endoscopic ear procedures.

Results: HRCT provides extensive information on the ossicular chain, scutum, facial nerve canal, tegmen tympani, labyrinth, sigmoid plate, and mastoid air cell system. It assists in identifying bone degradation, evaluating the extent of cholesteatoma, locating anatomical irregularities, and selecting suitable individuals for an exclusively trans canal endoscopic approach. The spread of disease to the aditus ad antrum, mastoid antrum, and mastoid air cells, together with the degradation of the ossicles and tegmen, may indicate a higher likelihood of requiring a combined or trans mastoid surgical procedure. However, HRCT cannot reliably differentiate cholesteatoma from other soft tissues inside the middle ear, and little dehiscence of the facial nerve canal may be overlooked.

Conclusion: High-resolution computed tomography of the temporal bone is a crucial instrument in endoscopic ear surgery, facilitating customized surgical strategies and enhancing understanding of anatomical issues. The findings should be examined with clinical assessments, audiological evaluations, and intraoperative endoscopic outcomes. In some situations, non-echo-planar diffusion-weighted magnetic resonance imaging (MRI) is beneficial, particularly for the postoperative monitoring of cholesteatoma.

Keywords: High-resolution computed tomography; temporal bone; endoscopic ear surgery; cholesteatoma; preoperative imaging; surgical planning.

1.INTRODUCTION

Endoscopic ear surgery (EES) has evolved as an essential procedure in otological treatment, notably for therapeutic management of chronic otitis media, cholesteatoma, tympanic membrane perforations, and selected middle ear diseases. The use of rigid endoscopes using skewed optics offers an expansive field of vision and aids in the examination of anatomical areas that would be difficult to evaluate with a standard operational microscope. Structures such as the sinus tympani, facial recess, anterior epitympanum, and retrotympanum may be evaluated with increased visual access during endoscopic treatments. Notwithstanding these benefits, endoscopic ear surgery requires an in-depth understanding of temporal bone architecture and meticulous patient selection. The existence of pathological condition infiltrating the mastoid, degradation of essential osseous structures, or anatomical discrepancies may affect the viability and safety of a solely trans canal endoscopic technique. Preoperative imaging plays a crucial role in assessing the severity of the illness and recognizing possible surgical obstacles.

High-resolution computed tomography (HRCT) of the temporal bone offers superior imaging of intricate bony features and is extensively used in evaluating middle ear and mastoid disorders. It might exhibit ossicular degradation, scutum disintegration, tegmen irregularities, labyrinthine defects, facial nerve canal anomalies, and the degree of mastoid engagement. Present radiological guidelines designate computed tomography (CT) as a crucial preoperative imaging technique for evaluating bone erosion associated with cholesteatoma, comorbidities, and surgical anatomy [1]. Moreover, data indicates that some CT characteristics correlate with the probability of transitioning from trans canal endoscopic ear surgery to a trans mastoid technique [2]. Consequently, HRCT may aid in surgical decision-making by enabling the surgeon to foresee operating challenges and assess the suitability of a solely endoscopic approach.

This study examines the significance of HRCT of the temporal bone in endoscopic ear surgery, highlighting its uses in anatomical evaluation, disease localization, patient eligibility, complication detection, and acknowledgment of imaging constraints.

2. Aim and Objectives

2.1 Aim

To assess the clinical importance of HRCT of the temporal bone in the preoperative assessment and surgical strategizing for endoscopic ear surgery.

2.2 Objectives

1. To elucidate the function of HRCT in assessing the structure of the middle ear and mastoid.
2. To analyze the significance of HRCT in determining patients for trans canal endoscopic ear surgery.
3. To assess the relevance of HRCT in detecting anatomical discrepancies and potential surgical - related issues.
4. To examine the limits of HRCT and the complementing function of MRI in specific clinical settings.

3. Materials and Methods

This work is organized as a descriptive research paper. Published research concerning HRCT of the temporal bone, the association between radiological and surgical findings in cholesteatoma, and preoperative imaging for endoscopic ear surgery were evaluated. Significant focus was directed on observational studies that juxtapose preoperative CT results with intraoperative observations, investigations into factors predicting the transition from trans canal endoscopic to trans mastoid surgery, and current radiological guidelines.

Pertinent material was located using PubMed-indexed publications and available scholarly papers. The investigation included high-resolution computed tomography of the temporal bone, endoscopic ear surgery, cholesteatoma, preoperative surgical strategizing, and the link between radiological and surgical findings.

The results were compiled descriptively based on their significance to anatomical assessment, disease severity, surgical viability, complication analysis, and imaging constraints.
As this is a narrative study rather than a systematic review, it does not pretend to contain every important article. No primary patient information, novel statistical evaluation, or autonomous appraisal of research quality was conducted.

4. Review of Literature

4.1 HRCT and the anatomical assessment of the temporal bone

The temporal bone encompasses a variety of tiny, interconnected structures, such as the ossicular chain, facial nerve canal, labyrinth, tegmen tympani, jugular bulb, and internal carotid artery canal. Thorough preoperative evaluation of these tissues is crucial in endoscopic ear surgery, since the surgeon works via the external auditory canal and must be cognizant of surrounding essential structures.

HRCT provides detailed pictures of the osseous structure of the middle ear and mastoid. It may illustrate the connection among the ossicles, epitympanum, facial nerve canal, lateral semicircular canal, and tegmen tympani. It may also identify anatomical discrepancies that might elevate surgical difficulty.

Abdul-Aziz et al. examined the correlation between preoperative temporal bone CT results and the viability of endoscopic ear surgery. Their retrospective analysis of 52 patients revealed that tegmen erosion, erosion of the malleus and incus, mastoid opacification, and soft-tissue infiltration into the aditus ad antrum and mastoid antrum correlated with the transition from a solely trans canal endoscopic method to a trans mastoid technique [2]. These results illustrate the prospective significance of HRCT in evaluating preoperative risks and formulating surgical strategies.

4.2 HRCT in the assessment of cholesteatoma

Cholesteatoma is a non-cancerous growth consisting of keratinizing squamous epithelium and collected keratinous material. It might gradually deteriorate neighboring osseous tissues and result in issues with the facial nerve, labyrinth, tegmen, and sigmoid plate.

HRCT is important in detecting distinctive imaging characteristics, such as soft-tissue opacification in the middle ear or mastoid, erosion of the scutum, destruction of the ossicles, and enlargement of the aditus ad antrum. These characteristics assist in delineating the anatomical scope of the ailment and provide a surgical guide.

Manik et al. performed a prospective investigation with 50 patients exhibiting clinically suspected cholesteatoma, juxtaposing HRCT results with intraoperative findings. They indicated a robust or excellent concordance between radiological and surgical results for many conditions, such as scutum erosion, sigmoid plate erosion, mastoid cortical dehiscence, and malleus erosion. Nonetheless, consensus was less favorable for facial canal dehiscence, demonstrating that CT results should not be considered infallible [3].

In endoscopic ear surgery, recognizing cholesteatoma in the epitympanum, sinus tympani, and other middle ear recesses might inform the surgical approach. Nonetheless, HRCT serves mostly as a tool for anatomical and osseous evaluation. Soft-tissue opacification by itself is insufficient to accurately differentiate cholesteatoma from granulation tissue, mucosal hypertrophy, or middle ear fluid accumulation [1,3].

4.3 HRCT in patient selection for endoscopic ear surgery

Optimal patient selection is crucial for the success of endoscopic ear surgery. While endoscopic examination may enhance access to concealed middle ear recesses, the capacity to see these regions does not inherently imply that all pathology can be effectively excised by a trans canal method.
Preoperative HRCT may assist in ascertaining whether the ailment is mostly localized to the middle ear or significantly infiltrates the mastoid. The presence of soft-tissue opacification in the aditus ad antrum, antrum, and mastoid air cells may suggest the progression of illness that would need a trans mastoid intervention.

In their examination of endoscopic cholesteatoma surgery, Abdul-Aziz et al. identified that the presence of soft tissue extending into the aditus ad antrum and mastoid antrum, in addition to mastoid opacification and ossicular erosion, was linked to the shift toward a trans mastoid technique [2]. These conclusions advocate for the use of HRCT during the planning of a purely endoscopic operation. Nonetheless, the choice to execute endoscopic-only surgery should not be based only on CT observations. The magnitude and reach of the illness, the structure of the external auditory canal, hearing ability, surgical skill, and intraoperative discoveries must also be evaluated.

4.4 Assessment of the ossicular chain

The malleus, incus, and stapes are vital elements of the auditory transmission system. The integrity of these structures significantly affects auditory results and the need for ossiculoplasty in middle ear operations. HRCT may reveal significant erosion, displacement, and irregularities of the ossicular chain. In cholesteatoma, the elongated segment of the incus is more susceptible to degradation. Identifying ossicular damage prior to surgery

may assist the surgeon in predicting the need for repair and advising the patient on possible hearing results.

Manik et al. revealed good agreement between HRCT and intraoperative results for malleus, incus, and stapes erosion, but the degree of agreement varied across the ossicles [3].
Within endoscopic ear surgery, this knowledge aids the surgeon in organizing the process and foreseeing whether ossicular repair would be required. However, delicate erosion, especially related to minor ossicular structures, may not always be correctly shown in imaging.

4.5 Evaluation of the facial nerve canal and labyrinth

The facial nerve canal and labyrinth are critical tissues that may be endangered with surgery for severe cholesteatoma. Deterioration of the facial nerve canal might increase the likelihood of nerve damage, whereas degradation of the lateral semicircular canal may suggest the presence of a labyrinthine fistula, potentially affecting auditory and vestibular capabilities.
HRCT may reveal osseous abnormalities affecting the facial nerve canal, lateral semicircular canal, and adjacent tissues. It may also detect anatomical discrepancies that might hinder dissection. Nevertheless, minor regions of facial nerve canal dehiscence could be challenging to identify accurately on CT. Manik et al. indicated a much lower concordance between HRCT and intraoperative observations regarding facial canal dehiscence compared to several other osseous anomalies [3].
Thus, the lack of an observable anomaly on HRCT does not entirely rule out facial nerve canal dehiscence. Surgeons must exercise vigilance during dissection, especially when the pathology is widespread or the typical anatomical references are altered.

4.6 Assessment of the tegmen tympani and sigmoid plate

The tegmen tympani constitute a section of the ceiling of the middle ear and delineates it from the middle cranial fossa. The sigmoid plate delineates the mastoid from the sigmoid venous sinus. Deterioration of any structure may signify progressive illness and heighten the likelihood of severe consequences.
HRCT is effective in detecting tegmen erosion, flaws in the sigmoid plate, and related osseous irregularities. These results might impact surgical strategy and notify the surgeon of potential dural exposure or venous sinus involvement. The research revealed a robust association between radiological findings and surgical outcomes for sigmoid plate erosion, along with a significant concordance for tegmen erosion [3]. These results endorse the significance of HRCT in detecting potentially perilous anatomical abnormalities prior to surgical intervention. When CT indicates tegmen abnormalities or potential cerebral involvement, further imaging, such as MRI, can be warranted based on the clinical context [1].

4.7 HRCT and the evaluation of hidden middle ear recesses

A significant benefit of endoscopic ear surgery is the enhanced visibility of physically concealed middle ear regions. These include the sinus tympani, facial recess, anterior epitympanum, and retrotympanum, where residual cholesteatoma could persist post-surgery. HRCT may assist in detecting soft-tissue opacification and related osseous irregularities in certain areas. Nonetheless, it is not always able to determine whether the opacified tissue signifies cholesteatoma or an inflammatory condition. A research investigation of reformatted trans canal CT images revealed the capability of recreating temporal bone imaging in a manner pertinent to endoscopic surgery. Such modifications may enhance the representation of individualized middle ear structures and the prevalence of ailments.
While this method shows potential, its significance must be assessed within the framework of the existing evidence. Traditional multiplanar high-resolution computed tomography serves as the recognized basis for preoperative evaluation of bony anatomy.

4.8 Limitations of HRCT and the role of MRI

Notwithstanding its benefits, HRCT has significant limitations. The primary constraint is the failure to consistently distinguish cholesteatoma from other sources of middle ear soft-tissue opacity. Additionally, minor regions of osseous erosion or facial nerve canal dehiscence could be overlooked, and postoperative alterations might complicate CT analysis.
Touska and Connor, in their guidelines for the European Society of Head and Neck Radiology, recognized CT as a crucial first imaging technique for the preoperative evaluation of cholesteatoma, especially for assessing the extent of the illness, bony erosion, comorbidities, and surgical anatomy [1].
MRI serves a supplementary function. Non-echo-planar diffusion-weighted imaging (non-EPI DWI) is very effective in identifying residual or recurring cholesteatoma post-surgery. It could also be suitable in some preoperative instances where the diagnosis or severity of the condition is

ambiguous.
Consequently, HRCT and MRI need to be seen as complimentary imaging techniques rather than as substitutes. HRCT mostly offers intricate bony structures, whereas non-EPI DWI MRI is very useful for detecting cholesteatoma tissue in certain clinical scenarios [1].

4.9 Relationship between imaging and residual cholesteatoma

The avoidance of residual cholesteatoma remains an essential target of middle ear surgery. Residual illness may emerge when epithelial matrix persists in difficult-to-access anatomical recesses, notably in the sinus tympani, facial recess, and anterior epitympanum. HRCT may reveal the anatomical spread of illness and related bony erosion prior to surgery; however, its capacity to identify minor postoperative residual lesions is limited, since soft-tissue opacification may indicate scar tissue, granulation tissue, fluid, or cholesteatoma. A comprehensive evaluation conducted by Amoodi et al. revealed that non-echo-planar diffusion-weighted MRI exhibited significant diagnostic precision in identifying recurrent or residual cholesteatoma, endorsing its use as a non-invasive substitute for second-look surgery in well-chosen patients [6]. Similarly, Touska and Connor advocated non-EPI diffusion-weighted MRI for postoperative monitoring and underlined its complimentary function to CT [4]. These findings highlight the importance of selecting the imaging modality according to the clinical question: HRCT is primarily useful for preoperative anatomical mapping, whereas non-EPI diffusion-weighted MRI is particularly valuable for postoperative detection of residual or recurrent cholesteatoma.

4.10 Comparison of HRCT with MRI in the preoperative assessment

HRCT and MRI provide distinct but complimentary insights in assessing middle ear pathology. HRCT enables greater visibility of fine bone anatomy, making it especially effective for examining ossicular erosion, scutum destruction, labyrinthine fistulae, tegmen defects, and mastoid involvement. In contrast, MRI offers superior soft-tissue delineation and may aid in distinguishing cholesteatoma from other middle ear conditions in some instances. Lingam and Bassett conducted a meta-analysis including 26 studies with 1,152 patient episodes, revealing a combined sensitivity of 91% and specificity of 92% for non-EPI diffusion-weighted MRI in identifying middle ear cholesteatoma. (6,7) These results illustrate the diagnostic significance of diffusion-weighted imaging, albeit minor lesions may go unnoticed. Contemporary European radiological guidelines designate CT as the principal imaging technique for preoperative evaluation, whereas MRI is reserved for certain clinical scenarios, highlighting the importance of non-EPI diffusion-weighted imaging in postoperative monitoring [4]. Accordingly, regular imaging choices should be guided by the probable pathology, the amount of illness, past surgical history, and the information necessary to assist clinical therapy.

5. Discussion

The research suggests that HRCT of the temporal bone plays a significant role in the preoperative assessment of patients preparing for endoscopic ear surgery. Its primary significance is in offering a comprehensive anatomical guide, pinpointing osseous degradation, outlining illness distribution, and acknowledging anatomical discrepancies that might affect the surgical method.
The results presented by Abdul-Aziz et al. are especially pertinent to endoscopic surgery since they directly link preoperative CT observations with the viability of performing cholesteatoma excision only by a trans canal endoscopic technique [2]. The propagation of the illness into the aditus ad antrum, mastoid antrum, and mastoid air cells may suggest that a solely endoscopic method will be inadequate. This data may assist surgeons in strategizing a potential integrated method and provide suitable preoperative guidance.
The diagnostic significance of HRCT is also reinforced by the radiological-surgical correlation research conducted by Manik et al., which revealed a beneficial concordance for several osseous anomalies linked to cholesteatoma [3]. Nonetheless, the variance in consensus across anatomical structures underscores the need of carefully interpreting CT results.
A notably significant factor is that HRCT is more dependable for evaluating bony structures than for delineating soft tissue. Despite the presence of bone erosion and the site of soft-tissue opacification indicating cholesteatoma, CT scans are not reliably able to distinguish cholesteatoma from granulation tissue or inflammatory alterations. This constraint is particularly significant in ears that have had prior procedures, since postoperative alterations may hinder the analysis of imaging results.
An additional factor to consider is radiation exposure. Due to the use of ionizing radiation in HRCT, it should be conducted only when the results are anticipated to significantly aid in diagnosis or surgical strategy. Imaging techniques must strive to provide sufficient diagnostic clarity while reducing radiation exposure.
In summary, HRCT ought to be regarded as a significant

supplementary tool rather than a standalone factor in determining the surgical method. The results should be amalgamated with clinical assessment, audiological analysis, surgeon proficiency, and intraoperative endoscopic evaluation. When used correctly, HRCT may enhance preoperative readiness and provide tailored surgical choices.

The viability of endoscopic ear surgery is contingent upon the severity of the condition, the accessibility of the affected anatomical areas, and the existence of related bony irregularities. HRCT offers critical preoperative insights that assist the surgeon in deciding whether cholesteatoma may be addressed only by a trans canal endoscopic method or if a hybrid endoscopic and microscopic technique is necessary. Abdul-Aziz et al. illustrated that particular CT findings of the temporal bone, such as tegmen erosion, ossicular erosion, mastoid opacification, and the infiltration of soft tissue into the aditus ad antrum and mastoid antrum, correlated with the transition from a solely endoscopic technique to a trans mastoid method [2]. These results highlight that HRCT serves as a means to predict surgical intricacy rather than only validating the diagnosis. Nevertheless, the existence of mastoid opacification does not inherently exclude endoscopic surgery, since opacification may indicate inflammatory alterations rather than a significant cholesteatoma. Consequently, the prevalence of the illness, related bone degradation, clinical observations, and the surgeon's expertise must be evaluated together when determining the surgical method.

The diagnostic efficacy of HRCT is contingent upon the precision with which its results align with the true severity of the illness seen following surgical intervention. While HRCT reveals intricate details of bony erosion and anatomical linkages, its sensitivity fluctuates based on the specific anatomical structure, lesion size, and imaging quality. Manik et al. assessed the diagnostic efficacy of HRCT in individuals with suspected cholesteatoma and contrasted radiological results with intraoperative findings. Their research corroborated the efficacy of HRCT in detecting several types of bony erosion, although with differing levels of concordance among anatomical structures [3]. This differentiation is especially crucial in endoscopic ear surgery, since minor disease sites may be concealed inside the sinus tympani, facial recess, and anterior epitympanum. HRCT may assist in pinpointing areas that need specific focus, although a seemingly normal bony contour does not rule out the existence of cholesteatoma or minor anatomical anomalies. Thus, the surgeon needs to use the CT scan as a preoperative anatomical reference and employ methodical endoscopic examination to evaluate the extent of the illness during the operation.

Variations in the anatomy of the temporal bone may greatly affect the safety and practicality of endoscopic ear surgery. An elevated jugular bulb, anomalous internal carotid artery, low-positioned tegmen, exposed facial nerve canal, and deviations in the trajectory of the sigmoid sinus may heighten the likelihood of intraoperative problems. HRCT facilitates an intricate evaluation of these skeletal connections and assists in recognizing possibly perilous anatomical structures prior to surgical intervention. Touska and Connor highlighted that preoperative CT serves as a surgical guide and aids in detecting erosive problems affecting the ossicles, labyrinth, facial nerve canal, tegmen tympani, and sigmoid plate [4]. Identification of these anomalies is especially crucial in revision surgery, congenital temporal bone irregularities, and those with significant cholesteatoma. Nonetheless, HRCT does not guarantee the elimination of surgical risk, and meticulous dissection is crucial even when imaging seems unremarkable. Consequently, the incorporation of preoperative radiological evaluation into surgical planning is essential to enhance readiness and diminish the risk of preventable harm.

One of the principal advantages of endoscopic ear surgery is its ability to visualize areas that may remain hidden during conventional microscopic surgery. The sinus tympani, facial recess, anterior epitympanum, and retrotympanum are clinically important because cholesteatoma may extend into these regions and remain undetected during surgery. Tarabichi and Kapadia described the advantages of endoscopic ear surgery in accessing these hidden recesses and improving visualization of middle ear disease [5]. Although the endoscope provides direct visualization during surgery, HRCT complements this technique by demonstrating the underlying bony anatomy and the distribution of associated soft-tissue opacification. This combined approach may help the surgeon identify regions requiring careful inspection and correlate the radiological findings with intraoperative observations. However, HRCT cannot consistently identify small residual cholesteatoma or distinguish it from inflammatory tissue. Consequently, the improved visualization offered by endoscopy and the anatomical information provided by HRCT should be considered complementary components of comprehensive surgical assessment.

Limitations of HRCT and implications for clinical practice

Notwithstanding its significant diagnostic use, HRCT has limits that should be acknowledged throughout the interpretation of results and surgical planning. Initially, soft-tissue opacification is ambiguous and fails to consistently distinguish cholesteatoma from granulation tissue, mucosal hypertrophy, or fluid accumulation. Secondly, nuanced osseous abnormalities, especially those affecting the facial nerve canal, could be overlooked. Thirdly, anatomical alterations after surgery might complicate interpretation, hence limiting the efficacy of CT in detecting minor residual abnormalities. Moreover, HRCT entails exposure to ionizing radiation; hence, imaging should be conducted only when the anticipated diagnostic or surgical advantage warrants the risk of exposure. Touska and Connor highlighted that CT should mainly serve to delineate surgical anatomy and recognize bony problems, but MRI plays a crucial role in identifying residual cholesteatoma post-surgery [4]. Consequently, HRCT results must not to be assessed in seclusion. A thorough evaluation that includes otoscopy, audiometry, clinical history, and relevant supplementary imaging is essential for tailored surgical planning.

Future perspectives

Subsequent investigations have to concentrate on enhancing the incorporation of HRCT results into preoperative strategies for endoscopic ear surgery. Future investigations linking certain radiological indicators with intraoperative endoscopic results may assist in determining which CT characteristics most reliably forecast disease severity, the need for transitioning to a trans mastoid technique, and the likelihood of remaining cholesteatoma. Uniform radiological documentation of ossicular degradation, tegmen stability, facial nerve canal irregularities, labyrinthine fistulas, and mastoid involvement should enhance dialog between radiologists and otologists. Moreover, progress in image reconstruction and enhanced-resolution CT technologies may provide more intricate anatomical details, although their supplementary therapeutic advantages and radiation consequences want further assessment. Investigations should also explore whether the amalgamation of preoperative CT results with clinical factors and surgical proficiency might enhance patient selection and maximize results. Such advancements might facilitate the creation of a more uniform, evidence-driven methodology for using HRCT in endoscopic ear surgery.

6.Clinical Implications

The results of this examination have several practical ramifications for endoscopic ear surgery:

1. **Preoperative anatomical mapping:** HRCT delineates the anatomical features of the middle ear and mastoid while pinpointing tissues that might be endangered during surgical procedures.
2. **Assessment of disease extent:** The pattern of soft-tissue opacification and related bone erosion may assist in assessing the feasibility of a trans canal intervention for the condition.
3. **Selection of the surgical approach:** Extension into the mastoid and related osseous irregularities may suggest the need for a trans mastoid or hybrid technique.
4. **Anticipation of reconstruction:** Ossicular erosion found on HRCT may assist the surgeon plan for probable ossiculoplasty.
5. **Identification of complications:** Tegmen anomalies, labyrinthine fistulas, degradation of the sigmoid plate, and potential irregularities in the facial nerve canal might affect surgical strategy.
6. **Complementary imaging:** MRI, specifically non-EPI DWI, might be suitable for further characterisation of a suspected cholesteatoma, particularly in the context of postoperative monitoring.

7. Conclusion:

High-resolution computed tomography of the temporal bone serves as a significant imaging complement in endoscopic ear surgery. It offers comprehensive insights into the anatomy of the middle ear and mastoid, aids in assessing the severity of cholesteatoma, detects ossicular and other bony degradation, and facilitates the identification of anatomical discrepancies and possible surgical risks. Special focus must be directed on the progression of illness into the aditus ad antrum and mastoid, erosion of the tegmen, destruction of the ossicles, labyrinthine fistulas, and irregularities concerning the facial nerve canal.
The existing research supports the significance of HRCT in preoperative strategizing and evaluating the viability of a solely trans canal endoscopic method. Nonetheless, one must acknowledge its shortcomings in distinguishing soft tissues and identifying minor osseous abnormalities. HRCT must be analyzed with clinical observations, audiological evaluations, and surgical expertise, with MRI used

judiciously for further tissue characterization or monitoring of postoperative cholesteatoma.
In summary, HRCT serves not only as an imaging modality but also as a crucial element in personalized preoperative strategizing for endoscopic ear surgery, aiding the surgeon in foreseeing anatomical obstacles, choosing a suitable surgical technique, and readying for any consequences.

Compliance with Ethical Standards:

The procedure performed in this case report was in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards."

Funding:

This study is not funded by any resources.

Conflict of Interest:

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this paper.

Ethical Approval:

The study was published with written consent of the patient.

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