e-ISSN: 2747-2051

Archives of the Medicine and Case Reports

[AMCR]

https://hmpublisher.com/index.php/amcr

Reconstructive Challenges and Outcomes Following Radical Resection of Sinonasal Squamous Cell Carcinoma via Weber-Ferguson Approach: A Case Study

Ni Putu Deby Rathasari[1*], I Gde Ardika Nuaba[1], I Ketut Suanda[1]

[1]Department of Otorhinolaryngology and Head/Neck Surgery, Faculty of Medicine, Universitas Udayana/Prof. Dr. I.G.N.G. Ngoerah General Hospital, Denpasar, Indonesia

ARTICLE INFO

Keywords:
Head and neck cancer
Reconstructive surgery
Sinonasal squamous cell carcinoma
Total maxillectomy
Weber-Ferguson approach

***Corresponding author:**
Ni Putu Deby Rathasari

E-mail address:
rathasarideby@gmail.com

All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.37275/amcr.v6i3.749

A B S T R A C T

Sinonasal squamous cell carcinoma (SCC) is an uncommon malignancy characterized by diagnostic delays and complex management. Advanced-stage disease often necessitates radical surgical resection, leading to significant anatomical defects and formidable reconstructive challenges. The Weber-Ferguson approach provides wide surgical exposure for extensive tumors but results in considerable midfacial defects requiring meticulous reconstruction to restore function and aesthetics. This case study details the reconstructive challenges and outcomes following total maxillectomy with this approach for an advanced sinonasal SCC. A 53-year-old male presented with a one-month history of right cheek pain and swelling, preceded by a year of right upper molar pain and progressive facial masses. Clinical and radiological evaluations revealed an extensive mass originating from the right maxillary sinus, destructing surrounding bony structures and involving regional lymph nodes. Biopsy confirmed poorly differentiated keratinizing squamous cell carcinoma. The patient underwent a right total maxillectomy via a Weber-Ferguson approach with Lynch modification, extended to involve the mandible, along with reconstruction. The final staging was T4aN3M0. Postoperatively, the patient experienced minor wound dehiscence, which was managed conservatively. He was planned for an obturator and adjuvant radiochemotherapy, but he declined further oncological treatment. Radical resection of advanced sinonasal SCC using the Weber-Ferguson approach, while oncologically necessary, presents substantial reconstructive dilemmas. Addressing these defects is crucial for functional rehabilitation, including speech, deglutition, and acceptable cosmesis. This case underscores the complexity of managing such extensive defects and the importance of a multidisciplinary approach, even when patients decline standard adjuvant therapies. The long-term prognosis in such cases remains guarded, particularly without adjuvant treatment.

1. Introduction

Sinonasal malignancies are a heterogeneous group of tumors arising from the nasal cavity and paranasal sinuses, accounting for less than 1% of all human cancers and approximately 3-5% of all head and neck malignancies. Among these, squamous cell carcinoma (SCC) is the most common histological subtype, often representing more than 50% of cases in some series. Despite its relative rarity, sinonasal SCC (SNSCC) poses significant clinical challenges due to its anatomical complexity, proximity to vital structures such as the orbit and skull base, and often late presentation. The insidious onset of symptoms, which frequently mimics benign inflammatory conditions like chronic rhinosinusitis or dental issues, contributes to diagnostic delays, with a large proportion of patients (reportedly up to 88%) presenting with advanced-stage disease (Stage III or IV).[1,2]

The etiology of SNSCC is multifactorial. Established risk factors include occupational

exposure to substances such as wood dust (particularly hardwoods), nickel, chromium, leather dust, and formaldehyde. Other implicated factors include tobacco smoking, alcohol consumption, and certain viral infections, notably high-risk human papilloma virus (HPV) types, particularly HPV type 16, although its role in SNSCC is less defined than in oropharyngeal SCC. Genetic predispositions and chronic inflammation may also play a role. The case presented herein involves a patient with a history of consuming grilled and salted fish, a dietary habit that has been anecdotally linked to some head and neck cancers in certain populations, though strong evidence for sinonasal specific risk is less clear compared to more established factors like occupational inhalants or smoking, the latter of which was denied by this patient.[3,4]

The clinical presentation of SNSCC is varied and largely depends on the primary tumor site and its extent of invasion. Early symptoms are often vague and nonspecific, including unilateral nasal obstruction, rhinorrhea, epistaxis, facial pain or pressure, and hyposmia/anosmia. As the tumor progresses, more alarming symptoms may arise due to invasion of adjacent structures. Orbital involvement can lead to proptosis, diplopia, visual disturbances, and epiphora. Oral symptoms, such as dental pain, loose teeth, palatal ulceration or swelling, can occur with inferior extension. Facial swelling, paresthesia (due to trigeminal nerve involvement), and trismus (with pterygoid muscle or infratemporal fossa invasion) are also common in advanced stages. Intracranial extension can manifest as severe headaches, cranial nerve palsies, and, rarely, cerebrospinal fluid (CSF) rhinorrhea. The patient in this report presented with cheek pain, facial swelling, and a history of dental pain, indicative of a locally advanced tumor.[5,6]

Diagnosis of SNSCC relies on a combination of thorough clinical examination, including nasal endoscopy, detailed radiological imaging, and histopathological confirmation from a biopsy. Computed tomography (CT) is crucial for assessing bony erosion and tumor extent within the sinuses, while magnetic resonance imaging (MRI) offers superior soft-tissue delineation, particularly for evaluating orbital, intracranial, perineural, and dural invasion. Positron Emission Tomography (PET)-CT scans may be used for staging, assessing regional nodal involvement, and detecting distant metastases. The AJCC (American Joint Committee on Cancer) TNM staging system is paramount for treatment planning and prognostication.

The management of SNSCC, especially advanced-stage disease, is complex and typically requires a multidisciplinary approach involving head and neck surgeons, radiation oncologists, medical oncologists, radiologists, pathologists, prosthodontists, and rehabilitation specialists. Surgery remains the cornerstone of curative-intent treatment for most resectable SNSCC. The primary goal of surgery is complete oncologic resection with negative histological margins. For extensive tumors, such as those involving multiple sinus walls, the palate, the orbit, or the anterior skull base, traditional open surgical approaches are often necessary to achieve adequate exposure and en bloc resection. The Weber-Ferguson incision, often with modifications like a Lynch extension, is a classical transfacial approach that provides wide access to the maxilla, nasal cavity, ethmoid sinuses, and pterygopalatine fossa. While effective for tumor extirpation, this approach results in significant midfacial defects and potential cosmetic and functional morbidity.[7,8]

Radical resection via approaches like the Weber-Ferguson inevitably leads to substantial three-dimensional defects involving bone, soft tissue, and the lining of the oral and nasal cavities. Reconstruction of these defects is one of the most challenging aspects of management, aiming to restore vital functions (speech, mastication, deglutition, airway protection), maintain orbital support (if

applicable), provide aesthetic rehabilitation, and facilitate potential adjuvant therapy. The choice of reconstructive technique depends on the size and components of the defect, patient factors (comorbidities, previous treatments), and available resources. Options range from simple obturators to complex microvascular free tissue transfer, including osteocutaneous flaps (for instance, fibula, iliac crest, scapula) for bony and soft tissue restoration, or soft tissue flaps (such as radial forearm, anterolateral thigh, rectus abdominis) for lining and bulk.[9,10]

This case study aims to describe and discuss the diagnostic presentation, surgical management, and particularly the reconstructive challenges and outcomes in a patient with advanced (Stage IVB T4aN3M0) poorly differentiated keratinizing squamous cell carcinoma of the sinonasal tract who underwent total maxillectomy via a Weber-Ferguson approach extended to the mandible, followed by reconstruction. The report will highlight the complexities encountered in such extensive resections and the critical role of reconstructive efforts in achieving functional and aesthetic goals, while also touching upon the prognostic implications and patient choices regarding adjuvant therapy.

2. Case Presentation

A 53-year-old Indonesian male presented to the Otorhinolaryngology-Head and Neck Surgery outpatient clinic at Prof. Dr. I.G.N.G. Ngoerah General Hospital with a chief complaint of pain in the right cheek for one month prior to admission. This was accompanied by swelling around the right jaw region. The patient reported that his symptoms initially began approximately one year ago with pain in the right upper molar teeth. This pain progressively worsened, and he subsequently noticed the appearance of a lump on his right cheek, measuring approximately 3x2 cm, and another in the right chin area, measuring approximately 4x3 cm, both of which had been enlarging over the preceding three months. He denied experiencing diplopia, epistaxis, tinnitus, or palpable neck lumps. His oral intake was maintained, though he consumed soft foods in small quantities. There was no history of fever, cough, or dyspnea. The patient reported a history of frequently consuming grilled foods, particularly grilled fish and salted fish. He denied any history of smoking. His occupational history and family history of malignancy were not detailed in the initial report.

On general examination, the patient was in a moderate general condition, conscious, cooperative (Glasgow Coma Scale 15), and his vital signs were within normal limits. Physical examination of the ears, including otoscopy and tuning fork tests, was unremarkable. Examination of the external nose revealed no deformities. Anterior rhinoscopy of the right nasal cavity showed a narrowed passage, with the inferior and middle conchae obscured and unevaluable. The left nasal cavity was also narrowed; the inferior concha was eutrophic, the middle concha appeared normal, and the nasal septum was deviated to the left. No secretions were noted. Posterior rhinoscopy revealed a post-nasal drip, but no mass was visualized. Nasoendoscopy of the right nasal cavity confirmed a narrowed lumen with the conchae not evaluable and the septum pushed laterally. The left nasal cavity appeared narrow on endoscopy, with eutrophic inferior and middle conchae; no nasopharyngeal mass was identified.

Examination of the oropharynx was within normal limits. Intraoral examination revealed a fragile, easily bleeding mass, approximately 1x1 cm in size, with indistinct borders and tenderness on palpation, located in the right palatal region. Indirect laryngoscopy findings were normal. There was no palpable cervical lymphadenopathy. Examination of the facial region revealed multiple masses in the right maxillary and right mandibular regions. The largest mass measured approximately 4x5 cm, and the smallest was 2x3 cm. These masses had well-defined borders, appeared hyperemic, were firm on palpation,

caused visible protrusion, were not warm to the touch, and were tender. Neurological examination of the cranial nerves revealed a right-sided facial nerve palsy, House-Brackmann grade V, at the extracranial level.

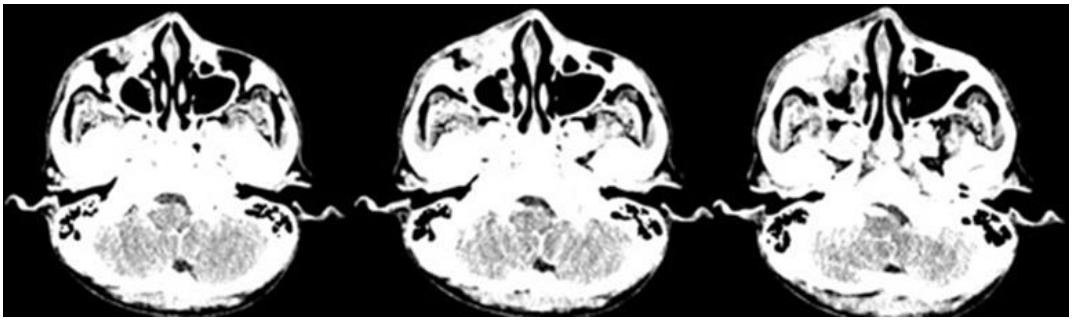

Figure 1. CT-scan imaging.

A contrast-enhanced computed tomography (CT) scan of the head was performed (Figure 1). Axial, coronal, and sagittal reconstructions revealed a large, solid, heterogeneous mass containing necrotic and calcified components within the right maxillary sinus. This mass was causing destruction of the anterior, medial, and lateral walls of the right maxillary sinus and the right orbital floor. It extended into the right infraorbital space and the right nasal cavity, infiltrating the right levator anguli oris muscle and the right inferior turbinate. Additionally, the mass caused destruction of the right alveolar process and the right zygomatic process. The radiological impression was that of a malignant mass. The CT scan also showed multiple suspicious conglomerated lymph nodes bilaterally in levels Ia/b, IIa/b, III, and VIII (retropharyngeal/retroparotid nodes, though level VIII is not a standard cervical level, likely referring to deep/posterior nodes). A chest X-ray showed a prominent cardiac silhouette but no pulmonary abnormalities. Laboratory investigations revealed leukocytosis (15,800/µL), a decreased hematocrit (36.80%), and a platelet count of 147,000/µL.

A biopsy of the sinonasal mass was performed, and histopathological examination of the tissue sections revealed a tumor composed of neoplastic epithelial cells proliferating in solid nests with an infiltrative pattern amidst a desmoplastic stroma extending into adipose tissue. The tumor cells were polygonal with abundant eosinophilic cytoplasm, an increased nuclear-to-cytoplasmic (N/C) ratio, and markedly pleomorphic, round to oval nuclei with irregular nuclear membranes, vesicular chromatin, and visible nucleoli. The mitotic rate was high, at 62 mitoses per 10 high-power fields. Moderate tumor-infiltrating lymphocytes were present. Keratin pearl formation was observed. Areas of necrosis within the tumor were also noted. One slide (VI) showed involvement of minor salivary gland tissue. There was no evidence of intravascular or perineural invasion in the examined sections. The histopathological conclusion was keratinizing squamous cell carcinoma, poorly differentiated, of the right sinonasal region.

Based on the clinical, radiological, and histopathological findings, a working diagnosis of a right sinonasal tumor with extensive local invasion was made. The patient was planned for and underwent a right total maxillectomy using a Weber-Ferguson approach with a Lynch modification, combined with reconstruction, on March 13th, 2024.

Intraoperatively, a fragile tumor mass was found originating in the right maxillary sinus and extending into the ethmoid sinuses (anterior and posterior). The tumor had destroyed the anterior wall of the maxillary sinus, penetrating through to the overlying skin. Inferiorly, the mass destroyed the maxillary bone, the

hard palate, and the soft palate. The extent of mandibular involvement requiring resection was not explicitly detailed but implied by the initial description of the surgery being "extended to the mandible". The specifics of the reconstructive technique employed were not detailed in the provided report beyond the term "reconstruction".

Postoperatively, the patient was managed in the Intensive Care Unit (ICU) for one day before being transferred to a regular ward. The postoperative diagnosis was right sinonasal tumor with local extension, status post total maxillectomy via Weber-Ferguson approach with Lynch modification and reconstruction. His immediate postoperative medications included intravenous Ceftriaxone (1g every 12 hours) and Tranexamic Acid (500mg every 8 hours), with analgesia provided as per anesthetic team recommendations. An anterior nasal pack was placed in the right nasal cavity. The surgical wound was reported as well-maintained.

On the second postoperative day, the patient reported minimal pain at the surgical site, with no oral bleeding or fever, and his vital signs remained stable. The nasal packing was intact with no significant ooze. Oral examination showed no active bleeding from the operative site. He continued on intravenous therapy and received nutrition via a nasogastric tube (NGT). The anterior nasal pack was removed on the second postoperative day without active bleeding, and the patient was discharged on the third postoperative day. His discharge medications, administered via NGT, included Cefixime (200 mg every 12 hours), Tranexamic Acid (500 mg every 8 hours), and Paracetamol (500 mg every 8 hours). He was scheduled for a consultation with the dental service for obturator planning via the outpatient clinic.

On the seventh postoperative day, the patient presented for follow-up complaining that a portion of the suture line on his right cheek had slightly opened, with some blood-tinged mucous discharge from the site. Physical examination revealed minimal pus at the surgical site in the right maxillary region. Wound care was provided, and he was prescribed oral medications via NGT: Cefixime (200mg every 12 hours), Paracetamol (500mg every 8 hours), Metronidazole (500mg every 8 hours), Methylprednisolone (8mg every 12 hours), and Omeprazole (20mg every 12 hours). He was educated on wound care, including thrice-daily compresses with Betadine-soaked gauze, and scheduled for regular follow-up for wound management.

Based on the comprehensive evaluation, including the histopathology report and staging investigations, the final diagnosis was established as Sinonasal Carcinoma Stage IVB (T4aN3M0) status post total maxillectomy with Weber-Ferguson approach (Lynch modification) and reconstruction. The patient was counselled regarding the need for adjuvant radiochemotherapy; however, he declined any further oncological treatment.

3. Discussion

The management of advanced sinonasal squamous cell carcinoma (SNSCC), as presented in this case of a T4aN3M0 keratinizing, poorly differentiated SCC, is exceptionally challenging, encompassing extensive surgical ablation and complex subsequent reconstruction. The patient presented with a locally advanced tumor (T4a), indicating invasion of structures such as the anterior orbital contents, skin of the nose or cheek, minimal extension to the anterior cranial fossa, pterygoid plates, or sphenoid/frontal sinuses. The N3 status signifies metastasis to a lymph node greater than 6 cm in greatest dimension, or any node(s) with clinically overt extranodal extension. This Stage IVB classification carries a grim prognosis, compounded by the histopathological finding of poorly differentiated keratinizing SCC. Poor differentiation is generally associated with more aggressive tumor behavior and a higher likelihood of recurrence and metastasis.

Table 1. Summary of patient's clinical findings (Further Revised).

Category	Parameter	Detailed findings
Demographics	Age & Gender	53-year-old male
	Ethnicity/Nationality	Indonesian
Anamnesis	Presenting Complaint	Right-sided facial pain, duration of one month.
	History of Present Illness	Concomitant swelling in the right mandibular region. Antecedent history of right maxillary molar pain commencing approximately one year prior. Progressive worsening of pain. Emergence of palpable masses in the right cheek (approx. 3x2 cm) and right submandibular area (approx. 4x3 cm), exhibiting progressive enlargement over the preceding three months. Denial of diplopia, epistaxis, tinnitus, or palpable cervical lymphadenopathy. Maintained oral intake, restricted to soft-consistency foods in diminished quantities. No reported pyrexia, cough, or dyspnea.
	Past Medical History	Not available.
	Social & Dietary History	Reported frequent consumption of grilled foods (notably fish) and salted fish. Denied history of tobacco use. Alcohol consumption history: Not specified. Occupational exposure history: Not specified.
	Family History	No significant family history of malignancy was reported.
	Allergies	No known drug allergies (NKDA)
Physical examination	General Assessment & Vital Signs	General physical status: Moderate. Level of consciousness: Alert and cooperative (Glasgow Coma Scale: 15). Vital Signs: Within normal physiological limits (Blood Pressure 120/80 mmHg, Heart Rate 80 beats/minute, Respiratory Rate 18 breaths/minute, Body Temperature 36.5°C). Nutritional status: Unspecified (Appears adequately nourished).
	Head & Neck Regional Examination:	
	- Otological Examination	Otoscopy and tuning fork assessments: Unremarkable, within normal limits.
	- Nasal Examination (External & Anterior Rhinoscopy)	External nose: No gross deformity. Right nasal cavity: Stenosis of the nasal passage; inferior and middle turbinates obscured, precluding evaluation. Left nasal cavity: Stenotic; inferior turbinate eutrophic, middle turbinate appeared normal; nasal septum deviated to the left. No significant secretions observed.
	- Posterior Rhinoscopy	Evidence of post-nasal drip; no mass visualized.
	- Nasoendoscopic Evaluation	Right nasal cavity: Confirmed luminal narrowing; turbinates not evaluable; septum displaced laterally. Left nasal cavity: Narrowed; inferior and middle turbinates eutrophic. Nasopharynx: No identifiable mass.
	- Oral Cavity & Oropharyngeal Examination	Oropharynx: Within normal limits. Right palatal region: A friable, exophytic lesion (~1x1 cm) with indistinct margins, demonstrating contact bleeding and tenderness upon palpation. Dentition: Status of right maxillary molars not explicitly detailed, aside from historical pain.
	- Laryngeal Examination	Indirect laryngoscopy: No abnormalities detected.
	- Cervical Examination	No palpable cervical lymphadenopathy.
	- Facial Region Examination	Multiple palpable masses in the right maxillary and right mandibular regions: Maximum dimension of largest mass: ~4x5 cm. Minimum dimension of smallest mass: ~2x3 cm. Characteristics: Well-demarcated, hyperemic, firm consistency, causing visible protrusion, non-febrile to touch, tender on palpation.
	Neurological Assessment	Cranial Nerves: Right-sided peripheral facial nerve palsy, House-Brackmann Grade V. Other cranial nerves: Unspecified (Functionally appeared intact for V, IX, X, XI, XII, inferred from absence of relevant symptomatology).
Laboratory investigations	Hematological Profile	White Blood Cell (WBC) Count: 15.8 x 10^3/µL (Leukocytosis). Hemoglobin: 12.5 g/dL. Hematocrit (Hct): 36.80% (Mildly reduced). Platelet Count: 147 x 10^3/µL (Lower limit of normal/Mildly reduced).
	Biochemical Profile	Renal Function Tests (Urea, Creatinine): Within normal limits; Liver Function Tests (AST, ALT, Bilirubin): Within normal limits; Serum Electrolytes (Na, K, Cl): Within normal limits; Coagulation Studies (PT, PTT, INR): Within normal limits.
Imaging studies	Computed Tomography (CT) of the Head (Contrast-Enhanced)	Primary Site: Right maxillary sinus. Morphological Characteristics: Extensive, solid, heterogeneous mass exhibiting internal necrotic and calcified foci. Bony Involvement/Destruction: Significant erosion involving the anterior, medial, and lateral walls of the right maxillary sinus; right orbital floor; right alveolar process; and right zygomatic process. Local Extension: Documented spread into the right infraorbital space and right nasal cavity. Soft Tissue Invasion: Infiltration of the right levator anguli oris muscle and right inferior turbinate. Nodal Metastasis: Multiple suspicious, conglomerated lymph nodes identified bilaterally in cervical levels Ia/b, IIa/b, III, and VIII (retropharyngeal/deep nodes). Overall Radiological Impression: Features consistent with a malignant neoplastic process.
	Chest Radiography	Prominent cardiac silhouette; no radiographic evidence of pulmonary metastases or other acute thoracic pathology.
Clinical diagnosis	Pre-operative Working Diagnosis	Right-sided sinonasal malignancy with extensive local invasion and regional lymphadenopathy. (Histopathological analysis subsequently confirmed poorly differentiated keratinizing squamous cell carcinoma, facilitating definitive TNM staging).

Table 2. Treatment and follow-up timeline.

Phase of care	Aspect	Details	Timeline / Specifics
Pre-operative planning	Diagnostic Workup	Clinical evaluation, contrast-enhanced CT scan of the head, chest radiography, and laboratory investigations (CBC).	March 2024
	Biopsy & Initial Diagnosis	Incisional biopsy confirming malignancy. Working Diagnosis: Right sinonasal tumor with extension to surrounding tissues.	March 2024
	Treatment Planning	Decision for surgical resection via Weber-Ferguson approach with Lynch modification, total maxillectomy, and reconstruction. Multidisciplinary consultation presumed. Informed consent obtained.	March 2024
Surgical intervention	Date of Surgery	March 2024	-
	Procedure Performed	Right Total Maxillectomy via Weber-Ferguson approach with Lynch modification. Reconstruction performed.	Operative time, estimated blood loss: Not specified.
	Intra-operative Findings	- Friable tumor identified in right maxillary, anterior/posterior ethmoid sinuses. - Extensive destruction noted: Anterior maxillary wall erosion through skin; inferior maxillary wall erosion through bone; destruction of hard and soft palate. - Mandibular involvement noted.	-
Immediate post-operative	ICU Admission	Patient admitted to the ICU post-surgery.	Duration: 1 day.
	Initial Management	- Right anterior nasal packing placed. - Intravenous antibiotics (Ceftriaxone 1g q12h). - Intravenous haemostatic agent (Tranexamic Acid 500mg q8h). - Analgesia administered per anesthesia protocol. - Wound status: Reported as well-maintained.	Postoperative Day 0-1
Inpatient recovery	Ward Transfer	Patient transferred from ICU to the regular surgical ward.	Postoperative Day 2
	Clinical Status (Ward)	- Reported minimal pain at the operative site. - No evidence of active oral or nasal bleeding. - Afebrile. - Vital signs stable. - Nasogastric tube (NGT) in situ for nutritional support.	Postoperative Day 2-3
	Wound/Drain Management	Anterior nasal packing removed; no active bleeding noted.	Postoperative Day 2
	Discharge Planning	Patient deemed stable for discharge.	Postoperative Day 3
	Discharge Medications	Prescribed oral medications via NGT: Cefixime 200mg q12h, Tranexamic Acid 500mg q8h, Paracetamol 500mg q8h.	At discharge (Postoperative Day 3)
Outpatient follow-up	First Follow-up Visit	Patient presented for routine follow-up.	Postoperative Day 7
	Findings at First Follow-up	- Complaint: Minor dehiscence of right cheek suture line with serosanguineous/purulent discharge. - Examination: Minimal pus identified at the maxillary region suture line.	Postoperative Day 7
	Management at First Follow-up	- Local wound care initiated. - Additional oral medications prescribed via NGT: Metronidazole 500mg q8h, Methylprednisolone 8mg q12h, Omeprazole 20mg q12h (in addition to continuing Cefixime and Paracetamol). - Patient education provided regarding wound care (thrice daily Betadine compresses). - Scheduled for continued routine outpatient wound care.	Postoperative Day 7 onwards
	Prosthetic Rehabilitation Plan	Consultation with Dental service planned for prosthetic obturator fitting.	Planned post-discharge.
	Adjuvant Therapy Recommendation	Adjuvant radiochemotherapy recommended based on final pathology and staging.	Following histopathology review.
	Patient Decision on Adjuvant Therapy	Patient declined the recommended adjuvant radiochemotherapy.	During post-operative consultation/follow-up.
	Further Oncologic Surveillance	Routine oncologic follow-up advised.	Ongoing

The presence of keratinization in a poorly differentiated tumor is somewhat unusual but indicates its squamous origin. The reported high mitotic rate (62/10 HPF) further underscores the aggressive nature of this malignancy. For extensive tumors of the maxillary sinus and surrounding structures, such as the one in this case that destructed multiple sinus walls, the palate, and extended to the skin and mandible, achieving adequate surgical exposure for complete tumor

extirpation is paramount. The Weber-Ferguson incision, often combined with a Lynch extension (medial orbital rim) as performed here, is a classic transfacial approach that provides excellent access to the entire maxilla, ethmoid sinuses, nasal cavity, pterygopalatine fossa, and even the anterior skull base. This approach allows for en bloc resection of large tumors, which is crucial for oncologic control. The decision to use an open approach like the Weber-Ferguson over endoscopic or other limited access techniques was justified by the sheer extent of the tumor, including destruction of the anterior maxillary wall to the skin and involvement of the mandible. Endoscopic approaches, while increasingly utilized for sinonasal tumors, are generally reserved for less extensive disease or can be used as adjuncts in carefully selected advanced cases, but the degree of invasion described here typically necessitates an open approach for margin control. The advantages of the Weber-Ferguson-Dieffenbach incision in similar cases include direct visualization, good tumor control during ablation, better control of negative margins, and improved hemostasis, favoring en-bloc resection. The trade-off for such extensive exposure is the potential for significant cosmetic deformity and functional impairment if reconstruction is inadequate.[11,12]

The radical resection performed, a total maxillectomy extended to the mandible with sacrifice of the palate and overlying skin, created a massive three-dimensional defect in the midface. The reconstructive goals in such a scenario are multifaceted: Separation of Cavities: To separate the oral cavity from the nasal and sinus cavities, preventing food and fluid regurgitation into the nose and enabling intelligible speech. Restoration of Palatal Integrity: Essential for normal swallowing and speech. Midfacial Support and Contour: To prevent facial collapse and provide acceptable aesthetic outcomes. Orbital Support: Ensuring the integrity of the reconstructed orbital floor is critical to prevent enophthalmos or diplopia if it was significantly resected. Mandibular Continuity and Function: If a significant segment of the mandible was resected, its reconstruction would be vital for mastication, oral competence, and lower facial contour. Soft Tissue Coverage and Lining: Providing vascularized tissue to cover exposed bone, protect vital structures, and replace resected skin and mucosal lining. Facilitation of Adjuvant Therapy: A well-healed, stable reconstruction allows for the timely initiation of radiotherapy or chemoradiotherapy. Dental Rehabilitation: Enabling the placement of a dental prosthesis or osseointegrated implants for functional mastication.[13,14]

Given the extent of the defect (total maxillectomy, palate, skin, possible mandibular segment), various options could have been considered: Obturator Prosthesis: While the patient was planned for an obturator consultation postoperatively, an obturator alone is often insufficient for such large defects involving external skin and significant bony loss, especially if mandibular reconstruction is also needed. It primarily addresses palatal defects. Local or Regional Pedicled Flaps: Options like a temporalis muscle flap for orbital support/bulk or a pectoralis major myocutaneous (PMMC) flap for external skin and some bulk are possibilities. However, a PMMC flap has limitations in reach for high maxillary defects and in providing specialized tissue like bone. Microvascular Free Tissue Transfer (Free Flaps): This is the gold standard for reconstructing large, complex maxillectomy defects involving multiple tissue types. Osteocutaneous Free Flaps: If significant maxillary and mandibular bone was resected, a fibula osteocutaneous free flap (FOFF) would be a prime candidate. It provides a long segment of vascularized bone that can be shaped with multiple osteotomies to reconstruct the maxillary arch and mandible, along with a reliable skin paddle for lining or external coverage. Other options include the iliac crest (DCIA flap) or scapular osteocutaneous flap. Soft Tissue Free Flaps: If bony reconstruction was less critical or

addressed by other means, a soft tissue free flap like the radial forearm fasciocutaneous flap (RFFF) for thin pliable lining, or an anterolateral thigh (ALT) flap or rectus abdominis myocutaneous (RAM) flap for bulk and larger skin paddles, could have been used. An ALT or RAM flap could provide the necessary volume to fill the maxillary defect and replace cheek skin.[15,16]

The challenges associated with any of these, especially free flaps, are considerable: Donor Site Morbidity: Harvesting any flap carries risks at the donor site. Recipient Vessel Selection and Anastomosis: Identifying suitable arteries and veins in the neck and performing microvascular anastomoses requires specialized skill. Flap Insetting and Shaping: Three-dimensional contouring of the flap to fit the complex defect is technically demanding. Prolonged Operative Time: Free flap reconstructions significantly add to the length of the surgery. Risk of Flap Failure: Despite high success rates, flap failure due to vascular thrombosis is a devastating complication. Functional Integration: Achieving good functional outcomes (speech, swallowing) even with successful reconstruction can be a long process and often requires extensive rehabilitation.[17,18]

The wound dehiscence and discharge experienced by the patient postoperatively point towards potential issues with healing, which could be related to the complexity of the reconstruction, tension on the closure, or early infection, despite antibiotic coverage. The immediate surgical outcome involved a relatively short ICU stay (1 day) and hospital discharge on the third postoperative day. The later development of wound dehiscence indicates a common challenge in these extensive resections and reconstructions.

Oncologically, the prognosis for this patient is unfortunately poor. Stage IVB SNSCC, particularly poorly differentiated histology and N3 nodal disease, has low survival rates. The refusal of adjuvant radiochemotherapy by the patient is a critical factor that will almost certainly negatively impact his chances of locoregional control and overall survival. Adjuvant therapy is standard of care for such advanced disease with high-risk features. The reported recurrence rate for SNSCC can be high, often within two years, and this risk is substantially elevated without adjuvant treatment. The plan for an obturator is a crucial part of the rehabilitation, aimed at improving speech and swallowing by sealing any residual palatal defect or supplementing the surgical reconstruction. Functional outcomes regarding speech, swallowing, and cosmesis are not yet detailed. The choice of open surgery and its potential benefits and drawbacks are consistent with literature discussions. The use of the Weber-Ferguson approach for extensive tumors is well-established. The classification of the maxillectomy as a Cordeiro Type IIIa (total maxillectomy with orbital content preservation) helps in standardizing the defect. The patient's refusal of further oncological treatment (radiochemotherapy) after being fully informed presents an ethical dilemma. While respecting patient autonomy is paramount, the clinical team has a duty to ensure the patient understands the likely consequences of this decision on their prognosis.[19,20]

4. Conclusion

This case study has detailed the multidisciplinary management of a 53-year-old male with an exceedingly advanced (Stage IVB T4aN3M0) poorly differentiated keratinizing squamous cell carcinoma of the right sinonasal tract. The extensive nature of the tumor necessitated a radical surgical approach, specifically a total maxillectomy via an extended Weber-Ferguson incision with involvement of the mandible, followed by reconstruction. The Weber-Ferguson approach provided the necessary wide exposure for the resection of this extensive malignancy, reaffirming its utility in advanced SNSCC, where complete tumor removal is the primary surgical goal. Such radical resections result in profound anatomical defects. Addressing these reconstructive challenges is paramount not only for aesthetic concerns but more critically for the

restoration of vital functions such as speech, deglutition, and airway protection. The planned obturator will play a role in functional rehabilitation. Despite the magnitude of the surgery, the patient had a relatively manageable early postoperative course, though complicated by a minor wound dehiscence. This highlights that complications can arise and require diligent management. The advanced stage, high-grade SNSCC carries a poor prognosis. This is further compounded by the patient's decision to decline recommended adjuvant radiochemotherapy, a choice that underscores the importance of respecting patient autonomy while ensuring comprehensive counselling on treatment implications.

The reconstructive journey for patients undergoing radical maxillectomy is often long and requires a dedicated multidisciplinary team. Future follow-up on this patient would be invaluable to ascertain long-term oncological status, functional outcomes, and quality of life. This case contributes to the understanding of the formidable challenges encountered in treating advanced sinonasal SCC and emphasizes the critical interplay between radical oncologic resection and comprehensive functional and aesthetic reconstruction.

5. References

1. Wang L, Xu Z, Sun M, He H, Li Z. Advances in the treatment of unresectable locally advanced esophageal squamous carcinoma (Review). Mol Clin Oncol. 2025; 22(6): 50.
2. Malik S, Ansari A, Ahluwalia C. Locally advanced squamous cell carcinoma of the hard palate invading the maxillary sinus with ipsilateral maxillary chromoblastomycosis: Simply a rare coexistence or a causal relationship? Advances in Oral and Maxillofacial Surgery. 2025; 18(100530): 100530.
3. van Helmond SC, Cozzi S, Breugelmans B, Codazzi D, Valdatta L, Carminati M. Risk factors for incomplete excision of cutaneous squamous cell carcinoma: a single-center study performed on 1082 excisions in Northern Italy. JPRAS Open. 2025; 44: 316–30.
4. Ren S, Liu S, Zhang J, Liu H, Zhang D, Zheng Y, et al. Identifying Hepsin as a novel biomarker for human esophageal squamous cell carcinoma (ESCC) and its application in fluorescence imaging. Spectrochim Acta A Mol Biomol Spectrosc. 2025; 334(125707): 125707.
5. Mahajan D, Sambyal V, Sudan M, Uppal MS, Guleria K. Association of vascular endothelial growth factor gene polymorphisms with esophageal squamous cell cancer risk in North-West Indians: a case–control study. DNA and Cell Biology Reports. 2025; 6(1): 22–35.
6. Dorafshar AH, Dellon AL, Wan E, Reddy S, Wong VW. Injured anterior superior alveolar nerve endoscopically resected within maxillary sinus. Craniomaxillofac Trauma Reconstr. 2017; 10(3): 208–11.
7. Cox JT, Tian J, Merbs S, Mahoney NR. Blood collection within the maxillary sinus following orbital fracture repair: The impact of mesh implants and drains. Craniomaxillofac Trauma Reconstr. 2019; 12(3): 167–73.
8. Marschall JS, Davis SS, Rysavy O, Kushner GM. Reconstruction of maxillary bone defects with cellular bone matrix allografts. Craniomaxillofac Trauma Reconstr. 2024; 17(4): NP263–70.
9. Abi-Saab T, Lozar T, Chen Y, Tannenbaum AP, Geye H, Yu M, et al. Morphologic spectrum of HPV-associated sinonasal carcinomas. Head Neck Pathol. 2024; 18(1): 67.
10. Lombardo AM, Sheetz T, Carrau RL, Zynger DL, Singer EA. An uncommon case of sinonasal adenoid cystic carcinoma

metastatic to the kidney treated with metastasectomy. J Kidney Cancer VHL. 2024; 11(3): 45–50.
11. Reinders AN, Gao J, Smile TD. Human Papillomavirus (HPV)-related multiphenotypic sinonasal carcinoma with intracranial extension and rapid recurrence: a case report. Cureus. 2024; 16(9): e68824.
12. Ethirajan P, Lakshmanan A, R S A, C R. Unlocking the enigma of human papillomavirus (HPV)-related multi-phenotypic sinonasal carcinoma: a case with aggressive morphology but a favourable prognosis. Cureus. 2025; 17(1): e78030.
13. Zhao X, Pei Z, Song X, Jin G. The role of radiotherapy in the treatment of sinonasal undifferentiated carcinoma: a population-based analysis. Head Neck. 2025; 47(1): 150–8.
14. Quan R, Han L, Wu S, Li X. Sinonasal small-cell carcinoma combined concurrently with small-cell lung carcinoma: case report and literature review. Front Immunol. 2025; 16: 1457907.
15. Takahashi Y, Gleber-Netto FO, Bell D, Roberts D, Su SY, Hanna EY. Identification of signaling pathways associated with resistance to induction chemotherapy in sinonasal undifferentiated carcinoma. J Neurol Surg B Skull Base. 2025; 86(S 01): S1–576.
16. Bitar G, Hsia B, Alshaka S, Sato M, Crawford J, Levy ML, et al. Comprehensive genomic profiling of sinonasal carcinomas: Identification of common mutations and potential targets for therapy. J Neurol Surg B Skull Base. 2025; 86(S 01): S1–576.
17. Bradová M, Costes-Martineau V, Laco J, Vaněček T, Grossmann P, Němcová J, et al. Sinonasal adenosquamous carcinomas arising in seromucinous hamartoma or respiratory epithelial adenomatoid hamartoma with atypical features: Report of five detailed clinicopathological and molecular characterisation of rare entity. Histopathology. 2025; 86(4): 585–602.
18. Jang H-B, Lee DH, Lim SC. Treatment outcomes of sinonasal adenoid cystic carcinoma: a single-center experience. Oral Oncol. 2025; 165(107317): 107317.
19. Hoerter JE, Tang SH, Eide JG, Salmon MK, Carey RM, Prasad A, et al. Nodal metastasis in surgically treated sinonasal squamous cell carcinoma. Research Square. 2025.
20. Hakim SA, Abd Raboh NM, Shash LS. IMP3 immunohistochemical expression in inverted papilloma and inverted papilloma-associated sinonasal squamous cell carcinoma. Anal Cell Pathol (Amst). 2021; 2021: 6639834.