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CASE REPORT

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Temporomandibular joint prosthesis in cancer reconstruction preceding radiation therapy

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Abstract

Total joint prostheses are a viable treatment option after removal of malignancies invading the temporomandibular joint, even when adjuvant radiation therapy is required.

KEYWORDS

cancer reconstruction, head and neck cancer, radiation therapy, temporomandibular joint, TMJ prosthesis

1 | BACKGROUND

A 78-year old patient presented with a tumor in the left parotid area. His medical history included type 2 diabetes, hyperlipidemia, gout, and essential hypertension. He had a total hip prosthesis on his left side. He was a former smoker of approximately five cigarettes per day but ceased the tobacco use 40 years before. The patient reported to have no previous or current alcohol consumption. Two skin lesions were removed from his left cheek and temporal region at a different hospital 5 months and 1 week prior to his first consultation. Both lesions were histologically classified as basal cell carcinomas (BCC) removed with narrow margins (1-3mm).

2 | METHODS

2.1 | Investigations

The patient was referred for assessment of a growing mass in the left parotid area. Computer tomography (CT) showed a tumor extending to the left mandibular condyle. MRI also described a tumor located in close proximity to the mandibular neck and condyle (Figure 1A), with probable infiltration of the masseter muscle and reactive inflammatory changes in the lateral pterygoid musculature (Figure 1B). There were no enlarged lymph nodes and no signs of a primary skin tumor. Fine-needle aspiration cytology (FNAC) was performed showing malignant epithelial cells. Further, a core needle biopsy confirmed a squamous cell carcinoma. It was at this stage not clear whether the tumor was a metastasis or a primary parotid tumor. Preoperative MRI showed no enlarged local lymph nodes, but lymph nodes with increased signal intensity in the masticatory space and subcutaneously on the left side. However, ultrasound of the neck did not detect pathological lymph nodes and it was therefore decided not to perform a neck dissection in addition to resection of the tumor and adjacent lymph nodes. CT including the neck and thorax showed no signs of a primary tumor, regional or lung metastasis. The histopathological report confirmed the initial diagnosis of squamous cell carcinoma, suggested as metastasis from skin cancer but difficult to distinguish from a

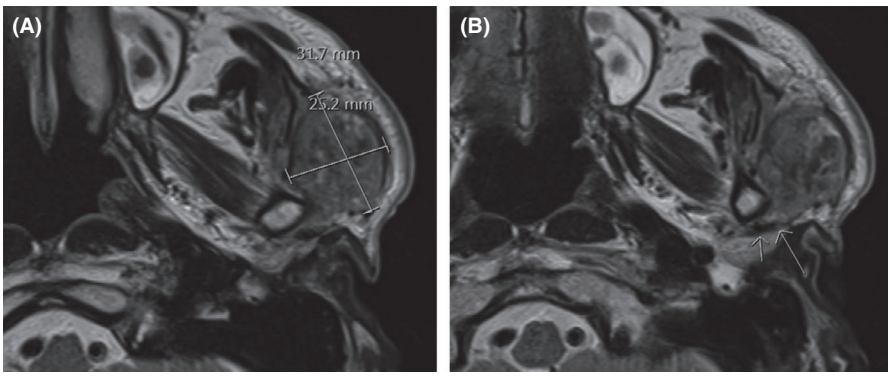

FIGURE 1 A, The patient presented with an irregular tumor with likely origin from the parotid gland located in close proximity to the mandibular neck and condyle. B, Ingrowth to the masseter muscle and reactive inflammatory changes in the lateral pterygoid musculature were found

primary parotid tumor histologically. The skin biopsies were re-examined, but the diagnosis of a basal cell carcinoma was not changed. Therefore, it could not be conclusively clarified that the tumor was in fact a metastasis from the skin lesions. However, no other primary tumor has been identified.

2.2 | Treatment

A total parotidectomy was performed with resection of overlying skin and the mandibular ramus and condyle (Figure 2A). A tumor sized 37x30x25 mm was removed. The tumor penetrated the superior branches of the facial nerve, which were cut. Adjacent lymph nodes were removed and were not invaded by the tumor in the final surgical pathology report. A stock total mandibular joint prosthesis was implanted (Biomet Microfixation, Jacksonville, FL, USA) with a mandibular component of titanium, and a fossa component of ultrahigh molecular weight polyethylene. The fossa component was attached with five 2.0 mm screws, 4 of 9 mm length, and 1 of 7 mm length. A standard size (55 mm) mandible component was fixed with four 2.7 mm bicortical screws of 8 mm length. Two polydioxanone (PDS) sutures were placed from the mandible to the fossa to stabilize the joint, due to the removal of the majority of masticatory muscle attachments (Figure 2B). The remaining part of the temporal muscle was mobilized and sutured to the buccal fat pad for improved soft tissue coverage of the prosthesis (Figure 2C). The skin flap was modified for primary closure without a skin graft (Figure 2D). Four mandibulo-maxillary fixation (MMF) screws were installed in a non tooth-bearing area, one in each quadrant, and elastics were applied to prevent early luxation of the joint. Cefuroxime 1.5 g was administered intravenously 3 times daily for 5 days after the operation. Postoperative radiation was planned and administered, starting 32 days after the operation. The total dose was 2 Gy x 32 (total 64 Gy) to the parotid area and 1.7 Gy

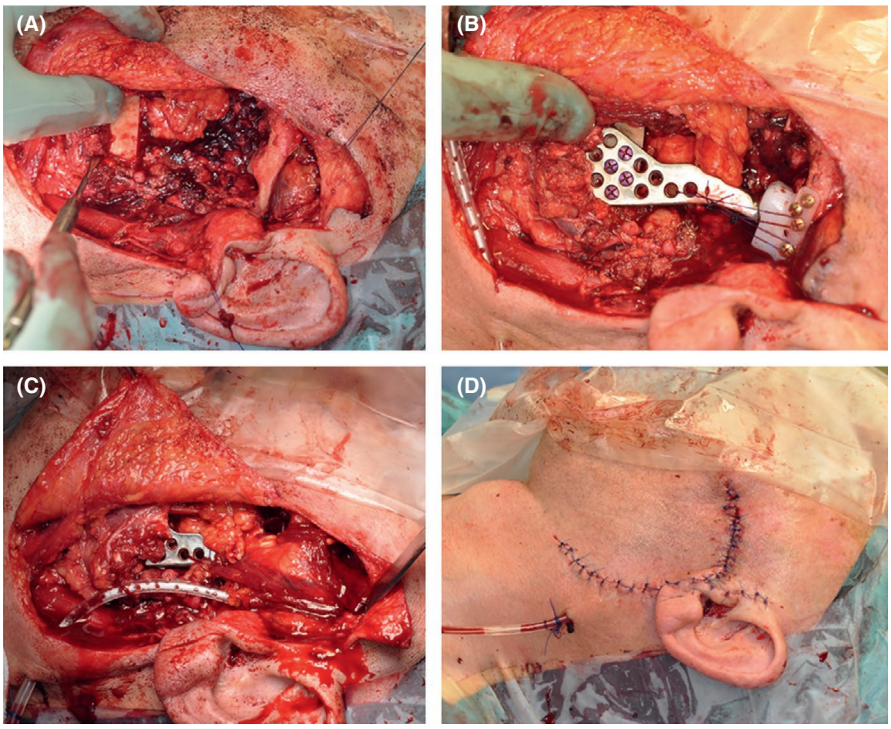

FIGURE 2 A, A total parotidectomy and resection of the mandibular ramus and condyle were performed. B, Implantation of a stock total mandibular joint prosthesis. C, Remaining part of the temporal muscle was rotated and sutured to the buccal fat pad for improved soft tissue coverage. D, The skin flap was modified for primary closure without a skin graft

x 32 (total 54.4 Gy) to lymph node stations II and III. Five fractions per week were given for 6 weeks and 2 days. The treatment was administered with curative intention and was tolerated well.

3 | RESULTS

The postoperative course was uneventful with adequate soft tissue healing and no infection. There was no luxation of the joint. Elastics were applied for 3 weeks, and the MMF screws were removed after 4 weeks. The patient had good joint function with a mouth opening of approximately 3 cm with a slight deviation toward the operated side, but no local symptoms in the jaw and parotid area. He had partial dentures in both jaws, which are planned to be revised in order to further improve chewing function. His primary complaint was dryness on the left eye due to the loss of facial nerve function. Surgical treatment with horizontal tightening of the lower eyelid and tarsorrhaphy is planned, and a possible implantation of a gold-lid in the upper eyelid depending on the result of the first operation. The patient currently has no sign of recurrence 1 year after surgery.

4 | DISCUSSION

Invasion of SCC to the parotid gland is rare, and local symptoms can be mistaken for temporomandibular disorders, which can possible delay the diagnosis.[1] It has been shown that the majority of patients with SCC in the parotid gland had prior skin lesions in an area known to drain to the gland. A minority of patients had a primary SCC of the parotid gland. Also, patients where gland involvement was detected more than 4 month after excision of the skin lesion had a poor prognosis.[2] Metastasis from head/neck cutaneous SCCs can be found in the parotid gland region due to the anatomy of the lymphatic vessels,[3] and up to 60-70% of metastatic nodes from facial skin SCCs have been detected in the parotid gland.[4] Also, tumor size > 6 cm or facial nerve involvement has been identified as poor prognostic factors, the latter being the case in the presented patient.[5] Also, skin lesions were removed 5 months prior to gland involvement, suggesting reduced prognosis. However, both lesions were histologically BCC and not SCC, and therefore, it could not be confirmed that the tumor was in fact a metastasis from the skin. As the tumor extended to the mandibular condyle, a resection was performed in order to achieve adequate surgical margins.

A total joint prosthesis is an established treatment modality for advanced disease of the TMJ, such as ankylosis and advanced ostheoarthritis. Also, TMJ prostheses have been applied after trauma and even benign tumors.[6] For malignant disease involving the TMJ, a bone graft is the standard treatment for reconstruction of the hard tissue in combination with appropriate soft tissue grafting when needed. Costochondral grafts or reconstruction plates with a condylar component can be used, and delayed reconstruction can in some cases be an alternative.[7] Nonvascularised grafts are however unsuitable when radiation therapy is indicated. Combined surgical and radiotherapy have been shown to achieve a better outcome with less relapse and higher survival compared with single modality treatment.[3] Prosthetic reconstruction of the joint has been shown in a case of adenoid cystic carcinoma of the external auditory canal where a condylectomy was performed along with the tumor removal. Reconstruction was performed 8 months after the first operation, and no radiation therapy was administered. Unfortunately, recurrence of the tumor occured shortly after the reconstruction.[6]

One disadvantage of bone grafts is the donor site morbidity. Also, accurate reconstruction of joint function is difficult, in particular if part of the fossa is missing. Reconstruction plates are prone to exposure and infection, in particular following postoperative radiation therapy. [7] Radiation also complicates delayed reconstruction due to the permanent reduced blood supply in the area. Implantation of a total joint prosthesis enables immediate restoration of joint function, but the risk of exposure of the prosthesis and potential infection due to decreased vascularisation to overlying soft tissue and fibrosis should be considered. To reduce radiation scattering, a titanium ramus component was used, with less density than the standard cobalt chromium alloy. Part of the skin and soft tissue surrounding the joint was removed increasing the risk of exposure and infection. A free flap was not performed for soft tissue augmentation, but pedicled temporal muscle and fat was rotated over the reconstructed area for increased soft tissue coverage. The report illustrates that this approach can be implemented, but further follow-up is scheduled in the coming 5 years to evaluate the long-term treatment outcome. No complications related to the joint prosthesis have been observed so far.

5 | CONCLUSION

This case illustrates that a TMJ total joint protheses may be a possible treatment option for reconstruction of cancer patients, even when adjuvant radiation therapy is required.

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We thank the patient for his kind cooperation and for granting permission to publish the report. Published with written consent of the patient.

CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

TØP: contributed to clinical assessment of the patient, drafting the manuscript, and approving the final version. SL, BL, and SL: contributed to clinical assessment of the patient, critical revision of the manuscript, and approving the final version.

ETHICAL APPROVAL

Consent from the patient was considered sufficient, and additional ethical approval was not required.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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