

Prosthodontic Rehabilitation of a Patient Using a Swing-Lock Lower Denture after Segmental Mandibulectomy

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Abstract - A swing-lock denture is useful in partially dentate patients where the configuration of the remaining teeth means that either the retention or stability available for a conventional removable partial denture is compromised. Such removable prostheses can also prove to be extremely useful when providing prosthodontic rehabilitation following surgical resection of oral cancer. A 20 year-old patient was referred to the Restorative Department of Cork University Dental Hospital following segmental mandibulectomy to treat a calcifying epithelial odontogenic tumour (Pindborg Tumour). Initial treatment using a conventional lower partial denture failed. This paper outlines the successfully rehabilitation using a lower Cobalt-Chromium swing-lock partial denture.

KEY WORDS: Swing-lock denture, Maxillofacial prosthodontics, Rehabilitation

INTRODUCTION

Head and neck cancer is the fifth most common cancer by incidence and the sixth most common cause of death from cancer worldwide¹. In the UK in 2006, there were 5,325 people diagnosed with oral cancer and the incidence is increasing as Cancer Research UK has reported a 44% rise since 1995². More than 90% of head and neck cancers are identified as squamous cell carcinomas and the progression of the disease results from alterations in the cellular and molecular pathways in the squamous epithelium³. Head and neck cancer treatment comprises surgery, radiotherapy, chemotherapy, or a combination of these modalities. However, for oral cancer, primary surgery is the treatment of choice and this is followed by radiotherapy in patients with advanced disease. Oral cancer treatment often leaves patients with significant problems which have to be overcome. Successful rehabilitation can be achieved through the expertise of a specialist maxillofacial prosthodontist who is cognisant of the needs and expectations of the patient. The prosthodontic needs of oral cancer patients include the rehabilitation of oral form and function that have been lost through treatment⁴.

A calcifying epithelial odontogenic tumor (CEOT) or Pindborg tumor is a rare odontogenic neoplasm that was first described by Pindborg in 1955⁵. This tumor is reported to comprise less than 1% of all odontogenic neoplasms. The most common mode of presentation is as a slow-growing intraosseous mass in the mandible in the fourth to fifth decade of life. There is no gender predilection. The aetiology is unknown, and no predisposing factors have been identified. Histopathology is the gold standard for diagnosis of CEOT. Characteristic features on histology are

polygonal epithelial cells, calcification, and eosinophilic deposits resembling amyloid⁶. Noncalcifying Pindborg tumor is very rare, with only three cases reported in the English language literature to date⁷⁻⁹. A Pindborg tumour is considered benign but can be locally aggressive in nature with recurrence rates of 10-15% reported⁵. Reported surgical treatment varies from simple enucleation to more radical resection of the affected bone¹⁰.

Case Report

A 20 year-old patient was referred to the Restorative Department of Cork University Dental Hospital. She had previously been treated in the Oral Surgery Department of the same hospital where she had presented 3 years earlier with pain and swelling associated with her lower right posterior teeth. A orthopantomogram radiograph was taken of her teeth which revealed a localised radiopacity associated with 45 (Figure 1). The swelling increased in size and a CT scan and biopsy of the area were taken. The histopathological report indicated the presence of a calcifying epithelial odontogenic tumour (Pindborg Tumour). Subsequently the patient underwent local curettage and removal of the associated tooth. However, the lesion did not resolve and the swelling associated with the right side of the mandible deteriorated. In view of the histology and investigations a decision was made to completely excise the lesion (segmental mandibulectomy). The temporomandibular joint was left intact and the resected area was reconstructed using a surgical reconstruction plate with a free flap and fibular graft (Figure 2). Conjunctive radiotherapy was not indicated in this case and there has been no evidence of recurrence of the tumour.

On presentation to the restorative department the patient was fit and well. She was not taking any medications and did not report any known allergies. Extraorally, the patient had a scar present on the right side of her chin extending to the submandibular gland area (Figure 3). The patient had profound numbness of her lower lip on the right side. Mouth opening was normal with no deviation noted. In-

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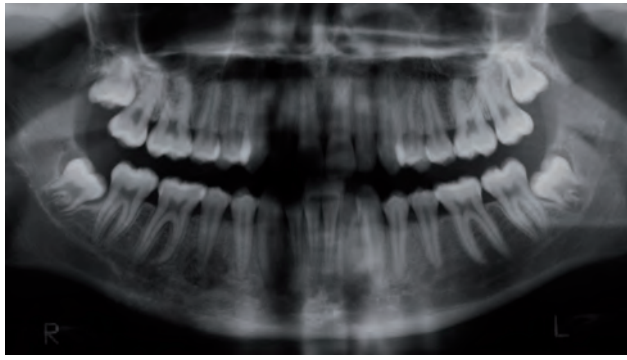


Figure 1. Initial radiograph illustrating radiolucency associated with 45



Figure 4. Intraoral view at presentation



Figure 2. Radiograph after reconstruction surgery using a reconstruction plate and fibular graft



Figure 5. Lower arch with missing teeth and skin graft in place



Figure 3 Patient's facial profile after reconstruction surgery

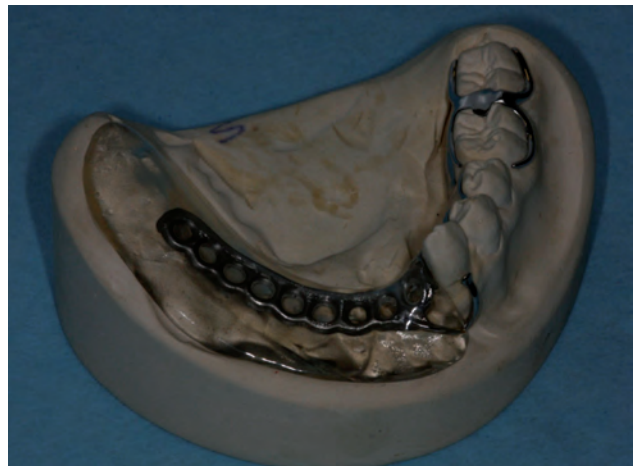


Figure 6. Initial conventional Cobalt-Chromium denture during construction



Figure 7. Swing-lock denture at wax try in stage



Figure 8. Swing-lock denture in patient's mouth



Figure 9 Patient's facial profile with lower swing-lock denture in place

traorally, oral hygiene was good with no evidence of dry mouth. On the upper arch the patient was fully dentate with no previous dental restorations. In the lower arch 37, 36, 35, 34 and 33 were the only teeth present with a skin graft in the lower right posterior region (Figures 4,5). The remaining lower teeth were unrestored and of very good prognosis. The patient had no previous experience of wearing any sort of removable prosthesis.

An initial treatment plan was drawn up to construct a lower removable Cobalt-Chromium partial denture. Primary impressions were taken and a lower wax registration block prescribed to record the patient's occlusion. Study models were articulated and surveyed with a Cobalt-Chromium framework designed (Figure 6). An RPI design was incorporated with the 33 used as the abutment tooth. An altered cast impression was taken of the large free end saddle/surgical site and the occlusion recorded. After a successful wax try in the denture was processed and fitted. The patient also underwent night time vital bleaching prior to the denture fit and the shade of the denture teeth were matched accordingly. However, the patient was reviewed on a number of occasions after denture fit and she complained of difficulty in wearing her prosthesis. The denture was very difficult for her to control and the retention provided by the clasps on 36 and 37 was insufficient to keep it stable in function.

The patient was reassessed and a further treatment plan was developed to provide her with a lower swing-lock denture. The case was discussed at length with the dental technician who was constructing the prosthesis and a design was agreed upon which included a locking mechanism positioned between 34 and 35. A special tray impression was taken using heavy and light bodied silicone and the framework constructed. An altered cast impression was made and the wax try in constructed (Figure 7). After a successful try-in the denture was processed and finished. The patient was instructed on inserting and securing the denture at the fit appointment where the importance of meticulous oral hygiene was emphasised. The swing-lock design provided a much more successful and stable denture for the patient. At initial review she was coping very well with her new prosthesis and minimal intervention was required. Six months later the patient is functioning very successfully with the prosthesis (Figures 8,9).

Further treatment options have been discussed for this patient including surgical debulking of the intra-oral skin graft and provision of dental implants. Implants may be possible in this case as the patient was not exposed to radiotherapy after her surgery. Implant placement would require very careful planning with the use of a Cone Beam CT image of the fibular graft site and surgical reconstruction plate.

DISCUSSION

This case illustrates the challenges of oral rehabilitation of a patient after radical surgical resection. Although this patient did not undergo radiotherapy after surgery she did present with loss of anatomical structures, altered oral anatomy, loss of sensation, scar tissue and a bulky skin graft in her lower right quadrant. In this case, successful rehabilitation was achieved using a swing-lock denture after conventional removable prosthodontics had failed.

The swing-lock denture is useful in partially dentate patients where the configuration of the remaining teeth is such that either the retention or stability available for a conventional removable partial denture is compromised^{11,12}. The design of the prostheses incorporates a conventional removable partial denture design with a 'swing-lock' component consisting of a preformed metal hinge and locking precision attachments in a single casting – a 'hinge', 'gate' and 'clasp'¹³. This additional component is usually placed in the labial sulcus. Indications for the use of a swing-lock component include scenarios where existing dental or alveolar undercuts do not provide sufficient retention for conventional removable partial dentures; the use of retentive clasps may lead to compromised aesthetics; the configuration of the remaining natural teeth is such that there is poor tooth support for the prosthesis. A swinglock design may also be considered where implant-retained prostheses are contra-indicated owing to financial or clinical reasons¹³.

The use of a swing-lock prosthesis would not be appropriate in scenarios where the patient's manual dexterity is such that they cannot correctly manipulate the clasping mechanism of the swinglock portion or where the patient has consistently demonstrated poor oral hygiene. They would be contraindicated in cases of advanced unstable periodontal disease or where a patient has a shallow sulcus or large frenal attachment in the area where the position of the bar is planned. In maxillary denture cases, a swinglock design is contra-indicated where the patient has a high smile-line due to the positioning of the metal work^{13,14}.

CONCLUSION

This case report demonstrates the effectiveness of the swing-lock concept in providing a removable prostheses where retention is compromised. The operational techniques and materials utilised are similar to those used in conventional removable prosthodontics. When utilised effectively, this technique can overcome challenging clinical cases in a simple fashion, whilst avoiding more invasive and expensive procedures.

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