

Case Report

Repair of skin covering osteoradionecrosis of the mandible with the fasciocutaneous supraclavicular artery island flap: case report

Abdoljalil KALANTAR-HORMOZI, Behzad KHORVASH

Division of Cranio-Maxillofacial Surgery, (Chief: Prof. A. Kalantar-Hormozi, MD),
Department of Plastic and Cranio-Maxillofacial Surgery, 15 Khordad Hospital,
Shahid Beheshti University of Medical Sciences, Tehran, Iran

Available online 11 September 2006

SUMMARY. Introduction: Osteoradionecrosis of the mandible is a serious complication following radiotherapy for head and neck cancer. Reconstructive procedures in the head and neck region use a wide range of flaps for defect closure. The methods range from local, mostly myocutaneous flaps and skin grafts to free microsurgical flaps to ensure a satisfactory functional and aesthetic result. Moreover, the donor site defect needs to be closed, with as little as possible functional or aesthetic impairment. Patient and method: A 60-year-old male is presented with a history of squamous cell carcinoma of the left lower lip and chin area in whom the tumour was resected and treated by adjuvant radiotherapy. The follow-up was complicated by chronic inflammation of the left mandibular body as a sequel of radiotherapy; it resulted with partial bone destruction, and soft tissue dehiscence. He was admitted for repair and treatment of the infected mandibular osteoradionecrosis. A supraclavicular artery island flap was used to close the mandibular soft tissue defect. Conclusion: The shoulder provides a relatively good skin texture and match to provide cover and lining for defects in the lower part of the face, in combination with minor donor site morbidity. © 2006 European Association for Cranio-Maxillofacial Surgery

INTRODUCTION

Radiation therapy is used for both definitive and adjunctive treatment for cancer. Irradiation may allow functional preservation of structures that otherwise would be excised (Miller and Janjan, 1996). Despite the apparent benefit of radiotherapy, the resultant chronic changes may be life long and cumulative.

Regarding the adverse effects of radiation, the mandible is the most commonly involved site in the head and neck area, with a far greater frequency than the maxilla or skull. The occurrence of osteoradionecrosis usually implies other coexisting problems and should not be thought of as a 'bone only' defect. The overlying mucosa and skin as well as muscle and bone are all affected and exhibit pathologic changes. The exact incidence of osteoradionecrosis following irradiation for head and neck cancer is unknown. The reported incidence ranges from 0.8% to 37% with many older series reporting approximately 10–15% (Watson and Scarborough, 1938; Wildermuth and Cantril, 1953; Grant and Fletcher, 1966; Bedwinek et al., 1976; Murray et al., 1980; Beauvillia et al., 1982; Coffin, 1983; Schweiger, 1987; Haber-Cohen and Debuski, 1990).

Bone exposure occurring after radiation therapy is especially concerning. Although ionizing radiation is quite effective in inducing tumour necrosis, it has

both acute and chronic effects on the soft tissues and mandible (Rubin and Casarett, 1968; Baker, 1982). Chronic effects on the skin include atrophy, oedema, hypo-pigmentation, telangiectasis, xeroderma and susceptibility to break down following minor trauma with a poor healing response (Miller and Rudolph, 1990). Histologically, obliterative endarteritis and a decreased number of blood vessels have been observed. Yet normal-appearing blood vessels are also seen microscopically (Rantanen, 1973; Marx and Ames, 1982; Marx, 1983; Marx and Johnson, 1987; Sanger et al., 1993).

Skin grafts or local flaps do not take well in this condition, and distant or micro-vascular free flaps which are well vascularized are the best options for cover of affected mandibles (Conley, 1972; Taylor and Palmer, 1987; Chen et al., 1994; Mailander et al., 1996; Shaha et al., 1997; Santamaria et al., 1998). In this paper a patient is presented who suffered from osteoradionecrosis of the mandible following surgery and radiotherapy for squamous cell carcinoma of the left mandible and in whom a supraclavicular artery island flap was used to provide adequate skin cover.

CASE REPORT

A 60-year-old man suffered from squamous cell carcinoma of the left lower lip and chin area. The

tumour was resected with a safety margin and the patient was sent for adjuvant radiotherapy. Four months later, he was readmitted due to a chronic wound under the left chin, (a sequel of osteoradionecrosis of the mandible; Fig. 1).

Initial therapy consisted of antibiotics and daily irrigation with physiological saline for a month. The antibiotic therapy was discontinued but the wound care was continued for another 4 weeks.

The wound did not heal and the body of the mandible was exposed.

In order to provide cover of the wound and the exposed mandible, a supraclavicular flap was designed (Fig. 2). Under general anaesthesia the wound was debrided with a 1 cm margin to reach well-perfused tissue and the necrotic mandible was burred down to healthy bleeding bone.

Meticulous care was taken to avoid any surgical iatrogenic injury to the acromiocervical region in order to allow harvesting of the flap.

The flap measured 5 cm (in width) by 6 cm (in length) and was raised beginning at its lateral end. Skin, subcutaneous tissue, and fascia were elevated



Fig. 1 – 60 year-old man; preoperative view.

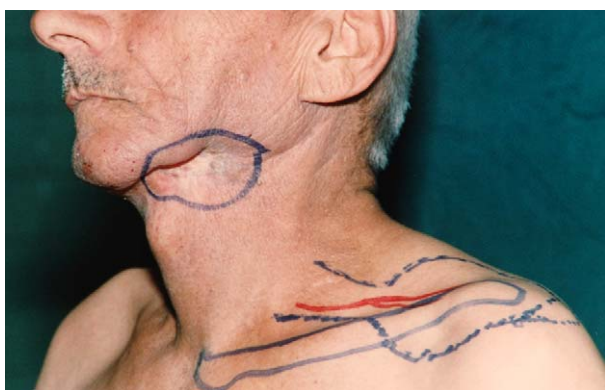


Fig. 2 – Same, preoperative marking.



Fig. 3 – Same, one year after operation.

enbloc with the supraclavicular vessels running axially. The deep fascia was included in the dissection. Care was taken to correctly identify the accessory nerve (which was preserved) and the supraclavicular vessels, with most of them arising from the superficial transverse cervical artery. These vessels emerge beneath or lateral to the posterior part of the omohyoid muscle and can be identified easily by transilluminating the flap in its medial aspect. Finally, the medial portion of the flap was dissected, and after the complete fasciocutaneous flap was mobile on its vascular pedicle, a 180° rotation on the vascular axis was possible.

The flap was transferred to the mandibular defect by subcutaneous tunnelling and was positioned with 140° of rotation. Closure was in two layers. The donor area was closed primarily in two layers after extensive undermining antero-posteriorly.

Postoperatively no complication was noted and the flap survived. The patient was followed up for 1 year without any complication or donor site morbidity being observed. He was satisfied from the aesthetic point of view (Fig. 3).

DISCUSSION AND CONCLUSION

There are several alternatives available regarding repair of wound break down due to mandibular osteoradionecrosis. Local and regional flaps provide the best colour and texture match (Gillies, 1920) but local flaps may be contraindicated due to the adverse effects of radiation. Free flaps are the primary choice but carry complications in 5–10% of cases; there may be technical problems and the aesthetic outcome largely depends on the donor site. Regional flaps are also more reliable when covering large defects and reduce the risk of complications when compared with free flaps.

The shoulder provides an easy-to-conceal donor site, which can be closed primarily. After clearly identifying the vascular pedicle, the supraclavicular

island flap can be used to cover a defect with a minimal complication rate and also provides a good texture of covering skin.

References

- Baker DG: The radiobiological basis for tissue reaction in the oral cavity following therapeutic x-irradiation. *Arch Otolaryngol* 108: 21–23, 1982
- Beauvillain IN, de Montreuil G, Billet J: Les osteoradionécroses et mandibulaires limitées. traitement chirurgical. *Annales d'Otolaryngologie (Paris)* 104: 579–585, 1982
- Bedwinek J, Shukovsky L, Fletcher G: Osteoradionecrosis in patients treated with definite radiotherapy for squamous cell carcinomas of the oral cavity and nasal- and oropharynx. *Radiology* 119: 665–667, 1976
- Chen YB, Chen HC, Hahn LH: Major mandibular reconstruction with vascularized bone grafts: indications and selection of donor tissue. *Microsurgery* 15: 227–237, 1994
- Coffin F: The incidence and management of osteoradionecrosis of the jaws following head and neck radiotherapy. *Br J Radiol* 56: 851–857, 1983
- Conley J: The use of regional flaps in major head and neck surgery. *J Otolaryngol Soc Aus* 3: 303–307, 1972
- Gillies HD: The rubed pedicle in plastic surgery. *NY Med J* 111: 1–8, 1920
- Grant BP, Fletcher GH: Analysis of complications following megavoltage therapy for squamous cell carcinoma of the tonsillar area. *Am J Radiol Radium Ther Nucl Med* 96: 28–36, 1966
- Haber-Cohen A, Debuski S: Management of oral and maxillofacial surgery procedures in irradiated patients. *Dent Clin North Am* 34: 71–77, 1990
- Mailander P, Berger A, Noah EM, Machens HG: Plastic reconstructive measures in tumor surgery. *Langenbecks Arch Chir Suppl Kongressbd* 113: 1156, 1996
- Marx RE: Osteoradionecrosis: a new concept of its pathology. *J Oral Maxillofac Surg* 41: 283–288, 1983
- Marx RE, Ames JR: The use of hyperbaric oxygen therapy in bony reconstruction of the irradiated and tissue-deficient patient. *J Oral Maxillofac Surg* 40: 412–416, 1982
- Marx RE, Johnson RP: Studies in the radiobiology of osteoradionecrosis and their clinical significance. *Oral Surg Oral Med Oral Pathol* 64: 379–390, 1987
- Miller MJ, Janjan NA: Treatment of injuries from radiation therapy. In: Kroll SS (ed.), *Reconstructive Plastic Surgery for Cancer*. St Louis: Mosby Year Book, 189–193, 1996
- Miller SH, Rudolph R: Healing in the irradiated wound. *Clin Plast Surg* 17: 503–508, 1990
- Murray CG, Herson J, Daly TE: Radiation necrosis of the mandible, a 10-year study. Part I. Factors influencing the onset of necrosis. *Intl J Radiat Oncol Biol Phys* 6: 543–548, 1980
- Rantanen J: Radiation injury of connective tissue. *Acta Radiol (Suppl)* 330: 1–92, 1973
- Rubin P, Casarett GW: Clinical radiation pathology as applied to curative radiotherapy. *Cancer* 22: 767–769, 1968
- Sanger JR, Matloub HS, Yousif NJ, Larson DL: Management of osteoradionecrosis of mandible. *Clin Plast Surg* 20: 517–530, 1993
- Santamaria E, Wei FC, Chen HC: Fibula osteoseptocutaneous flap for reconstruction of osteoradionecrosis of the mandible. *Plast Reconstr Surg* 101: 921–929, 1998
- Schweiger JW: Oral complications following radiation therapy: a five-year retrospective report. *J Prosthet Dent* 58: 78–82, 1987
- Shaha AR, Cordeiro PG, Hidalgo DA: Resection and immediate microvascular reconstruction in the management of osteoradionecrosis of the mandible. *Head Neck* 19: 406–411, 1997
- Taylor GI, Palmer JH: The vascular territories (angiosomes) of the body: experimental study and clinical application. *Br J Plast Surg* 40: 113–118, 1987
- Watson WL, Scarborough JE: Osteoradionecrosis in intra-oral cancer. *Am J Roentgenol* 40: 524–534, 1938
- Wildermuth O, Cantril ST: Radiation necrosis of the mandible. *Radiology* 61: 771–785, 1953

Abdoljalil KALANTAR-HORMOZI, M.D.

15 Khordad Medical Center
Aban Street, Karim Khan
Building Tehran, IRAN

Tel.: +98 21 88901108
Fax: +98 21 22271949
E-mail: Kalantarj@yahoo.com

Paper received 10 December 2003
Accepted 17 May 2005