



CASE REPORT

Functional deltoid muscle reconstruction following an extensive squamous cell carcinoma resection

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Abstract: Squamous cell carcinoma frequently occurs in an individual with albinism. In this case, the growth of the squamous cell carcinoma was aggressive that it invaded the deltoid muscle. After an oncologic resection, there was a huge defect which required near total resection of the deltoid muscle. Loss of deltoid muscle will lead to the loss of abduction and anterior flexion at the shoulder. This could be debilitating in a person's normal daily life and activities. Restoration of the shoulder abduction and flexion function with a pedicle bipolar latissimus dorsi flap transfer was chosen in this case due to the versatility and reliability of the flap.

Keywords: Latissimus dorsi flap; squamous cell carcinoma; reconstruction of the shoulder

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Introduction

Albinism is a genodermatosis with a high risk for non-melanocytic skin cancer, such as cutaneous squamous cell carcinoma and basal cell carcinoma, in sun-exposed regions. Individuals with albinism lack the ability to synthesize melanin, a photo-protective pigment found in the basal layer of the epidermis which determines the skin colour.

Squamous cell carcinoma (SCC) displays more rapid growth, has a greater tendency to invade deep structures such as muscle and bone, and to metastasize, as compared to basal cell carcinoma (BCC)^[1]. In this case, the squamous cell carcinoma had extended into the deltoid muscle. In order to completely remove the SCC, near total deltoid muscle resection was necessary. Absence of the deltoid muscle could be debilitating in a person's normal daily life as the normal arm will be hanging weakly at the shoulder joint with a complete loss of abduction and flexion. A functional muscle transfer using

the trapezius, latissimus dorsi, pectoralis muscle, biceps or triceps is essential for the restoration of the shoulder function^[2]. Restoration of the shoulder joint function may prevent the need for shoulder arthrodesis and therefore, the patient can still engage in his normal daily life and professional activity. A pedicle latissimus dorsi flap with a bipolar transfer was chosen in this case for the reconstruction of soft tissue at the shoulder.

Case report

A 45-year-old Malay male with albinism was constantly exposed to the sun due to his occupation as a fisherman. He underwent multiple excisions with or without a local flap and skin graft for numerous previous SCC and BCC. He noticed a rapidly growing, ulcerated and fungating lesion on his right shoulder measuring 10 x 10.5 cm² that had grown within a month. Magnetic resonance imaging was done, which demonstrated that the lesion had extended into the deltoid muscle while sparing the sur-

rounding muscles. He underwent wide local excision which included the affected deltoid muscle. Due to the loss of deltoid muscle and its large defect of 21 x 8 cm², a pedicle bipolar musculocutaneous latissimus dorsi flap transfer was chosen to reconstruct the shoulder.

The ipsilateral latissimus dorsi flap was designed according to the size of the defect and harvested as a pedicle musculocutaneous flap based on the thoracodorsal neurovascular bundle. A bipolar transfer was done where the origin and insertion of the latissimus dorsi was transected and raised as an island flap passing through the subcutaneous tunnel at the axilla. The flap was rotated 180° where its origin was attached to the clavicle and acromion, and its insertion was attached to the remnant of the deltoid muscle at the deltoid tubercle (Figure 1). Postoperatively, his right arm was placed in an abducted and internally rotated position. The arm was maintained in an abduction orthosis for six weeks. After six weeks, he was started on active and passive physiotherapy. He was able to attain 100° flexion and abduction after a year (Figure 2).



Figure 1. (A) Patient in lateral decubitus. Huge fungating lesion over the right shoulder 2cm margin taken. (B) Latissimus dorsi flap planning with a skin paddle of 24x7cm. (C) A Latissimus dorsi musculocutaneous flap harvested with both insertion and origin is transected based on the thoracodorsal neurovascular bundle. (D) Bipolar transfer of the latissimus dorsi flap with a rotation of 180°. Primary closure of the donor site.



Figure 2. (A, B) Contour of the right shoulder is almost similar with the left shoulder. (C) Full abduction.

Discussion

Squamous cell carcinoma is the second most common non-melanocytic skin cancer which contributes to substantial morbidity and mortality due to its potential to metastasize. Early recognition and resection of the tumour may be curable. The incident rates of SCC in the Asian population is 1.3–2.6 per 100,000 persons annually. The risk quintuples in a person with albinism^[1].

Oncologic wide resection of the lesion, together with the involved deltoid muscle, was indicated to attain a clear margin of cancer cells. A durable soft tissue reconstruction was necessary, especially at mobile joints, to maintain the shoulder function which plays a major role in daily life^[3]. Placing a flap, in comparison to skin graft, as wound coverage in a large defect is not only cosmetically better, but is also able to exceptionally withstand the radiation complications as it is less delicate and heals faster, owing to its own functional vascular circulation.

Latissimus dorsi muscle flap is a workhorse flap which is highly versatile and reliable. The latissimus dorsi muscle is wide and expendable, with a long free-lying neurovascular bundle^[4]. This will provide adequate coverage for a huge defect where a significant arc of rotation can be performed. In 1987, Itoh *et al.* reported the usage of latissimus dorsi innervated muscle flap as a replacement of the deltoid muscle^[5]. In this case, the latissimus dorsi pedicle flap provided both functional muscle replacement and skin cover. Due to its close resemblance to the deltoid muscle in its cross-section and excursion, shoulder abduction and flexion can be maintained. Bipolar transfer is where the origin and insertion

site of the latissimus dorsi muscle is transected while retaining its functional vascular circulation, which is the thoracodorsal vascular bundle^[6]. The muscle is then rotated and attached to the remnant of the excised deltoid muscle at both ends. Torsion and tension of the pedicle were able to be avoided in a bipolar transfer.

Conclusion

Pedicle latissimus dorsi flap has advantages such as the ease of flap elevation, which is less time consuming, and a long calibre neurovascular bundle with a constant anatomy made it the preferable and reliable flap for extensive defect of the shoulder. It not only provides good function, but is also cosmetically acceptable.

Conflict of interest

The authors declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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