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ORIGINAL ARTICLE

# Change of paradigm in thoracic radionecrosis management



*Changement de paradigme dans la prise en charge des radionécroses thoraciques*

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## MOTS CLÉS

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Lambeau perforant

**Summary** Classically, muscular or omental flaps are the gold standard in the management of thoracic defects following radionecrosis debridement. Their vascular supply and antibacterial property was supposed to enhance healing compared with cutaneous flaps. The evolution of reconstructive surgery allowed us to challenge this dogma. Therefore, we present five consecutive cases of thoracic radionecrosis reconstructed with cutaneous perforator flaps. In four patients, we performed a free deep inferior epigastric perforator (DIEP) flap and one patient had a thoracodorsal perforator (TDAP) flap. Median time healing was 22.6 days with satisfactory cutaneous covering and good aesthetic results. There were no flap necrosis, no donor site complications. We believe that perforator flaps are a new alternative, reliable and elegant option that questions the dogma of muscular flaps in the management of thoracic radionecrosis. © 2015 Elsevier Masson SAS. All rights reserved.

**Résumé** Classiquement, les lambeaux musculaires ou le lambeau de grand épiploon étaient les techniques de reconstruction de référence dans la gestion des radionécroses thoraciques. Leurs apports vasculaires et propriétés antibactériennes étaient censés améliorer la cicatrisation comparativement aux lambeaux cutanés. L'évolution de la chirurgie reconstructrice et le développement du concept de lambeau perforant nous ont permis de remettre en question ce dogme. Ainsi, nous présentons cinq cas de radionécrose thoracique consécutifs reconstruits par lambeaux perforants cutanés. Pour quatre patients, nous avons effectué un lambeau perforant épigastrique inférieur profond (DIEP) et une patiente avait bénéficié d'un lambeau perforant

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thoracodorsal (TDAP). Le temps moyen de cicatrisation était de 22,6 jours avec couverture cutanée satisfaisante. Il n'y a eu aucun cas de nécrose de lambeau, ni d'infection secondaire, ni de complications du site donneur. Nous croyons que les lambeaux perforants sont une nouvelle alternative, une option fiable et élégante qui remet en cause le dogme des lambeaux musculaires dans la gestion des radionécroses thoraciques.

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## Introduction

Radiotherapy plays a fundamental role in the treatment of breast cancer. It reduces the risk of local recurrence and increases survival rates [1,2]. Refinements of radiotherapy limit the radiation and thus reduces complications. Despite this, we are still faced with these radiation-induced lesions that may appear up to 20 years after irradiation. These lesions range from simple dermatitis to thoracic radionecrosis. In the event of radionecrosis, surgery is required. First step of surgical management consists of drastic debridement removing all radiodystrophic tissues leading to significant thoracic defects. Classically, muscular or omental flaps are the gold standard in the management of thoracic defects especially because of their vascular safety [3,4].

Anatomical studies on the skin vascularization carried out in the 1980s allow the advent of perforator flaps [5]. These flaps have the primary aim to reduce morbidity of donor sites. The deep inferior epigastric perforator (DIEP) flap [6] and more recently, the thoracodorsal artery perforator (TDAP) flap [7] have been described in breast surgery.

In this article, we describe use of cutaneous perforator flaps for thoracic defects following radionecrosis debridement.

## Material/method

Between 2011 and 2013, 5 patients with thoracic radionecrosis underwent thoracic reconstruction with perforator flaps.

For all these patients, biopsies were performed prior to plan any treatment to eliminate cancer recurrence or radiation induced sarcoma. Imaging re-staging was negative. To choose the most relevant treatment, we discussed these cases during a multidisciplinary team meeting. Surgical treatment was decided for all these cases.

All patients had an aggressive surgical debridement with reconstruction in the same time by perforator flap. Preoperative color doppler mapping was performed to determine perforators and pedicle position. When free flap was performed, recipient vessels quality was evaluated by color

Doppler, they included the internal mammary, thoracodorsal, thoracoacromial, and circumflex vessels. For DIEP flap, anastomoses were performed using microscope, with 9-0 nylon suture for both artery and vein, in an end to end fashion.

The donor site was sutured primarily.

## Results

All patients presented with thoracic radionecrosis secondary to breast cancer treatment.

Patient's characteristics are summarized in Table 1.

The patient's average age was 60.4 years. The average period of occurrence was 16 years.

All patients presented a large thoracic wall defect after the resection of radionecrotic tissues including osteoradionecrosis over the costal cartilages and ribs and resection of two ribs in one case (Fig. 1). The surface area of the soft tissue defect ranged from 68 to 380 cm<sup>2</sup> (mean: 163).

Histologically, resection margins were complete, no cancer recurrence was found.

Four patients had free DIEP flap for reconstruction, one patient had a pedicled TDAP flap (Fig. 3).

Table 2 summarizes the flap's details.

Median healing time was 22.6 days. Median length of hospitalization was 7,4 days. No intraoperative or postoperative revision of the vessels was required. There was no flap necrosis. No major complications were observed in donor sites. The aesthetic results were satisfactory with a good cutaneous covering.

## Discussion

Radiotherapy forms an integral part in cancer treatment today. This ionizing radiation is necessary for tumor death. However, it also causes damage to surrounding healthy tissues. Radiation-induced chronic injuries can manifest many years after the treatment. Radiation-induced fibrosis and dermal atrophy are observed, the principal pathogenesis is initiated by damage to the vascular endothelial micro-

**Table 1** Patients characteristics.

Patient	Age (years)	Breast cancer treatment received	Period of occurrence (years)
1	54	Mastectomy + radiochemotherapy	14
2	60	Mastectomy + radiotherapy	2
3	61	Radiochemotherapy	20
4	55	Mastectomy + radiotherapy	29
5	72	Mastectomy + radiotherapy	15

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