Chapter 12
Role of Reconstructive Surgery in Management of Cancer: Current State and Practice in Sub-Saharan Africa

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Abstract The primary role of reconstructive surgery in the treatment of cancer patients is to extend the ability of the surgeon to provide better prognosis and improve survival. This is particularly important in sub-Saharan Africa (SSA) where patients often present with extensive and late stage cancer. With reconstructive surgery, such patients are offered the best opportunity for cure and better quality of life. In SSA, women subjected to mastectomy suffer some degree of emotional setback that results from loss of the breast and unfortunately, reconstructive surgery after mastectomy is not practised routinely. Interdisciplinary set ups are desired where the experts put their heads together to design the treatment that will best suit the patient in most forms of cancer.

Appropriate imaging is essential to ensure complete tumour excision which is a prerequisite for definitive reconstruction. However, thorough imaging is defective in many centres due to lack of equipment. The surgeon is therefore often guided by experience and necessary tissue sampling. In conclusion, the important future role of reconstruction in cancer therapy will be enhanced by public health education, governmental and institutional policies to enable acquisition of equipment necessary for reconstruction and training of other health care providers to boost the efforts of the specialists in that field.

Keywords Reconstructive surgery • Sub-Saharan Africa • Musculo-cutaneous flap • TRAM flap • Cancer

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12.1 Introduction

Reconstructive surgery has improved the horizon for curative surgery in general patient management. Its primary role in the treatment of cancer patients is to extend the ability of the surgeon to provide better prognosis and improve survival especially in those with extensive and late stage cancer thereby offering patients the best opportunity for cure (Hasen et al. 2002) and better quality of life.

In sub-Saharan Africa (SSA), patients commonly present late to the physician. Many patients present in the first instance to traditional healers and to other personnel apart from the doctor for one reason or the other ranging from high cost of hospital management to the fear of the loss of body parts to ablative surgery. By the time the patient presents with an extensive disease that necessitates wide excisional surgery, there is a major reconstructive requirement.

Major reconstructive requirement is best met with a knowledge of the broad armamentarium that is often available in the area of surgical reconstruction. However, without the personnel and equipment back-up, for example for microvascular free tissue transfer, which is often the case in SSA, the choice becomes limited. For the same reason, expertise is lacking in the area of intensive peri-operative nursing and anaesthetic care of these patients. These constraints leave the average surgeon with a limited choice in dealing with the issue of the defect created after surgical excision. Regardless of the shortcomings in SSA, reconstructive surgery has opened up the horizon for improved quality of life in several patients who therefore may proceed to ask questions like: how do I look, feel, or how may I function subsequently? (http://www.cancercenter.com/community/newsletter/article/reconstructive-surgery-helps-cancer-patients-reshape-their-self-image/).

Post-surgical reconstruction is making a difference in the lives of many women with breast cancer. Taboos in SSA has prompted the unwillingness to undergo mastectomy and this for a long time made many women to present to the hospital with late stage disease. This gives rise to major defects that are usually reconstructed with latissimus dorsi and rectus abdominis musculo-cutaneous flaps, flaps that should normally be used in reconstructing the breast after mastectomy. For the few patients who present with early breast cancer, a larger percentage prefer immediate breast reconstruction.

The first patient that we operated on in the early 90s at Ibadan had a delayed reconstruction with a pedicled TRAM (transverse rectus abdominis muscle) flap. Not long after that, we performed our first free microvascular transfer of a TRAM flap as an immediate reconstruction in a lady who had presented with a breast sarcoma. Reconstructive surgeons had in this way, helped women to regain their confidence, dignity and sense of self. (http://www.cancercenter.com/community/newsletter/article/reconstructive-surgery-helps-cancer-patients-reshape-their-self-image/). I shall deal more on post excisional breast reconstruction at a later part of this communication.

12.2 Head and Neck Reconstruction

The most convincing data for improved psychosocial well-being through reconstructive surgery is in the case of breast cancer reconstruction after mastectomy (Hasen et al. 2002). However, it is reasonable to assume that all patients who undergo reconstruction to minimize defects and deformities due to cancer therapy feel some improvement in quality of life. Reconstructive surgery assists in achieving this and all surgeons must be conversant with the range of possibilities in their body region of practice. The algorithm below, (Fig. 12.1) modified from that used for covering scalp and skull defects (Oluwatosin et al. 1999), and may be used after tumour excision anywhere there is a defect.

In head and neck cancer, a tumour excision that leaves a deformity after reconstruction produces a low quality of life. An appropriate nasal reconstruction therefore has to be performed after nasal extirpation in extensive squamous or basal cell carcinoma. Similarly, auricular reconstruction should be performed where the ear has had to be removed after excision of squamous cell carcinoma. A patient who developed an asymmetrical smile along with facial asymmetry from facial nerve

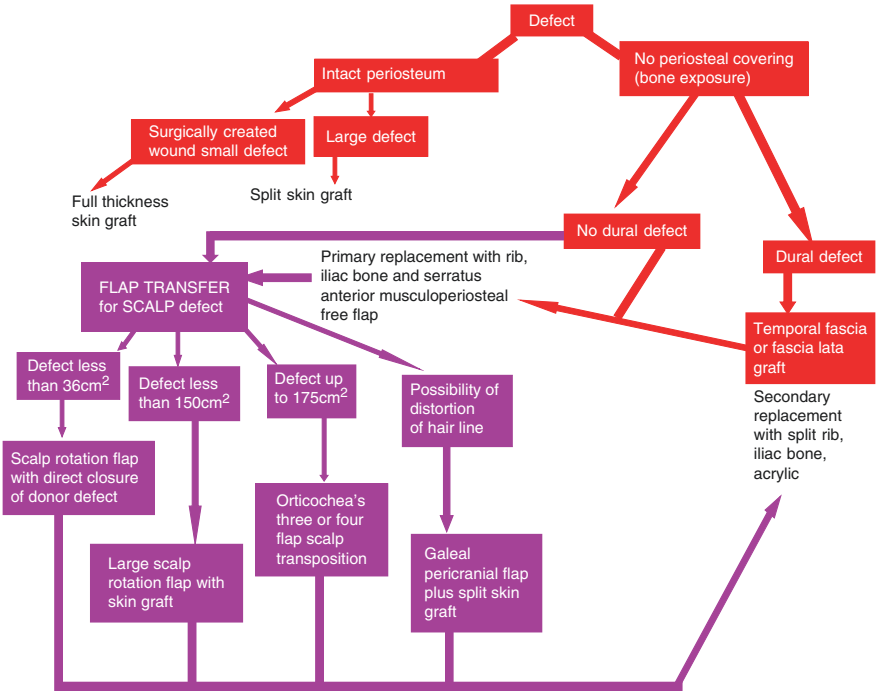

Fig. 12.1 Algorithm for treatment of scalp and skull fracture

palsy secondary to parotid or mastoid surgery will benefit from a cross facial nerve graft and a free tissue neurovascular muscle transfer for facial re-animation. We have reconstructed several pharyngeal and oesophageal defects with pectoralis major musculo-cutaneous flap and supraclavicular flaps after tumour excision.

Defects that approach half of the eyelid in size may be closed with a cheek rotation flap (Mustarde 1983). McGregor's (1973) modification of this flap involves use of a Z- plasty to assist in closing the donor site in the region of the temple. When a full lower lid loss is to be reconstructed, the cheek flap may be extended down to the front of the ear. Because these flaps consist only of the skin layer, over the newly reconstructed eyelid, they have to be under laid by chondromucosal graft taken preferably from the nasal septum (Oluwatosin 2015).

Patients who have had an orbital exenteration sometimes pose a problem as far as skin cover is concerned. The reconstructive method should be tailored to the defect and the patient's needs. When a prosthetic is planned, the goal should be to create an open cavity with a skin graft, regional flap, or thin free flap (Hanasono et al. 2009).

The reverse flow submental artery flap may be used in this regard (Karacal et al. 2005) and also for reconstruction of the lower and middle thirds of the face as well as oral cavity. Skin take over bone is usually poor for the reason that ordinary cortex does not supply the vascularity required for skin graft take. If the area is carefully decorticated, graft take may be enhanced. Bulky flaps are indicated when a closed cavity is preferred, such as when no prosthetic is planned or when the defect is extensive. To fill up the orbit, a temporalis (Oluwatosin et al. 2000), or distant latissimus dorsi flap may be used. These muscle flaps will readily accommodate skin grafts on top of them.

12.2.1 Nasal Reconstruction

The nose is about the most prominent part of the face and attention should be provided to its detailed reconstruction for the patient's emotional well-being. For losses in the nasion, and upper part of bridge of the nose, a glabella transposition "finger", or sliding flap, and for losses involving tip and supratip areas, bilobed flaps may be transferred.

The bilobed flap is particularly suited for the region of the nose. Here, when a transposition flap is transferred to cover a defect, a smaller flap may be raised at 90° to it to cover the donor site. When there is a combined tip and ala loss surface, the seagull flap (Millard) may be utilised. For the lateral side of the ala, a nasolabial flap, either as a transposition or as a VY advancement flap will be useful.

In planning alar reconstruction, when one of the two epithelial surfaces is intact, support and cover can often be delivered reliably but if substantial amount of all three layer are lacking, the reconstruction becomes more complex. The nasolabial turnover flap/composite graft combines the advantage of producing the three layers of the nostril with transfer in a single stage. A superiorly based nasolabial flap, lined

internally by auricular chondrocutaneous, nasal septal chondromucosal, or hard palatal mucosal graft is a possibility. Another alternative is the use of a superiorly based nasolabial flap whose distal tip may be folded in for lining. Most authors recommend a delay procedure for this method thus adding the disadvantage of a second stage.

Hunt's concept of using posterior auricular skin as a flap based on the anastomosis of superficial temporal artery and postauricular artery was refined by Washio and others. It provides thin auricular skin and thicker mastoid skin combined with ear cartilage. It however carries the disadvantage of requiring a second stage of division of flaps.

12.2.1.1 Nasal Defect Classification

A system for scoring and classification of nasal defects has been proposed by Bayramicli (2006). Here, it is assumed that the soft tissue coverage of the nose is in continuity with the cheeks, glabella and upper lip while the osteocartilaginous infrastructure is in continuity with the two nasofrontal buttresses, the frontal bar and the palate. Division of soft tissues and skeletal framework into sub-units and grading these on a logo, based on their gravity in reconstructive strategies, any nasal defect is described by shading the involved sub-units on the logo. The sum of the points appended each sub-unit gives the total score of defect.

The severity of the tissue loss is assessed according to a "classification system" which is derived from this scoring system. Thus nasal defects are classified into one of four main types corresponding to their scores viz:

Type Ia, which is characterised by limited simple soft tissue defects or
Type Ib, which is characterised by soft tissue defects complicated with only a single minor framework unit.
Type II, characterised by limited soft tissue defects complicated by the loss of at least one framework unit (mostly a major one) and inner lining.
Type III defects are determined by large soft tissue defects along with the loss of several skeletal framework units.
Type IV comprises mid-face defects with the total loss of all principal nasal subunits which are complicated by major skeletal and/or soft tissue extensions.

An Algorithm Proposed in Management of these Defects Is as Follows

Simple local flaps or skin grafts are the optimal solutions in Type Ia, which practically means a soft tissue loss without any framework component. In Type Ib where there is deficiency of a single minor framework subunit (mostly an ala), necessitates a more complicated local flap reconstruction. Median forehead flap refined with cartilage grafts is frequently indicated for the reconstruction of Type II defects. When this type of defects occurs as a part of a large mid-face defect or when the local flap options are not available, reconstruction with a free flap can also be

considered (Bayramicli 2006). This algorithm is yet to be embraced by reconstructive surgeons and individual variations occur in dealing with defects and deformities that emanate from cancer excision.

12.3 Post Mastectomy Reconstruction

Women subjected to mastectomy suffer some degree of emotional setback that results from loss of the breast. This may be corrected by the introduction of a semblance of breast tissue; either in form of an implant or by transfer of tissue from one part of the patient to the other, or a combination of both.

Since facilities for microvascular free tissue transfer are lacking in most of SSA, centres that embark on such reconstructions are few and the facilities are not sustained. In SSA, reconstructive surgery after mastectomy is not practised routinely. There are unfortunately very few collaborative centres where the surgical oncologists specializing in breast surgery works with reconstructive surgeons and other care providers for the total benefit of these patients. Perhaps at the best, there are multidisciplinary approaches where the care is carried out in the different clinics of these specialists. Interdisciplinary set ups are desired where the experts put their heads together to design the treatment that will best suit the patient.

Currently the options include:

1. Use of implants: this may be considered when the soft tissues, that is, skin and muscle of the anterior chest wall can adequately accommodate an implant. The absence of breast tissue makes it necessary to use an implant larger than one that would be used for augmentation. If the pectoralis major muscle is present, the implant should be inserted submuscularly, that is behind or posterior to it.
2. Use of tissue expander: when the soft tissues are intact but inadequate, the available skin should be expanded using a tissue expander inserted under the skin or submuscularly if pectoralis muscle is present and filled weekly with saline until more than required tissue has been gained. The expander is then replaced by an implant. Tissue expansion may be complicated by infection and skin necrosis.
3. Use of flaps: as an alternative to using an expander, a latissimus dorsi musculocutaneous flap may be transferred on its thoracodorsal artery pedicle not only to fill up an infraclavicular hollow but also to add to the anterior chest soft tissue under which an implant can be placed. Advances in reconstruction have led to refinements in the use of autologous (self) tissue for breast reconstruction. Thus in places where implants are not easily available or where they are unpopular, “self” tissue may be transferred either pedicled or as a free flap.

TRAM flap requires removal of the rectus muscles from the abdomen and some of the fascia of the abdominal wall. The deep inferior epigastric perforator (DIEP) flap however, provides abdominal skin and subcutaneous tissue much like the TRAM flap but it spares most or all of the rectus muscles and fascia. Patients are therefore believed to have decreased post-operative pain, less post-surgical abdominal wall weakness and a decreased chance of abdominal wall hernia formation. On the other hand, DIEP patients stand a greater risk of partial flap loss and fat necrosis relative to the free TRAM patients. During flap harvest, these perforators are meticulously dissected free from the surrounding muscle, which is spread in the direction of the muscle fibers and preserved intact. Other perforator flaps have been used in breast reconstruction including superficial inferior epigastric artery, superior gluteal artery perforator, thoraco-dorsal artery perforator and lumbar artery perforator ("love handle") flaps.

12.4 Abdominal Reconstruction

When tumour removal has involved a large part of the abdomen, a major reconstructive dilemma is the prevention of herniation through the provision of a fascial layer or a neurotised muscle flap as part of the coverage. An example is when there has been an extensive dermatofibrosarcoma protuberance (Odeyinde et al. 2011) (Fig. 12.2). In SSA where facility for a large free microvascular anterolateral thigh fascio-cutaneous flap may be lacking, such extensive flap may be transferred as a pedicled flap to resurface the abdomen. We have on a previous occasion used a split skin graft on an omental flap (Fig. 12.3) that was spread over fascia lata harvested as free fascial grafts from the thigh.

Fig. 12.2 Abdominal dermatofibrosarcoma

Fig. 12.3 Reconstruction after excision of abdominal dermatofibrosarcoma with omental flap (*top*) and skin graft (*bottom*)

12.5 Adjuvant Radiotherapy

An issue for consideration is the timing of reconstructive surgery when radiation is contemplated. It is possible to embark on it early when well-vascularized tissue covers an area of planned treatment. Thus a patient who had a radical laryngectomy with pharyngeal reconstruction and adequate skin closure can have his radiation therapy almost immediately as opposed to the situation of when his wound healing is delayed. On the other hand, use of local and even regional flaps are not advisable shortly after radiation therapy. In such circumstances, microvascular free tissue transfer may be the only option available. It is usually better to await tissue recovery which may be as long as 6 months especially when teletherapy has been employed.

Performing radical tumour excision assumes tumour free edges. To ensure this, it is important that appropriate imaging studies are carried out prior to surgery. Very few centres have facilities to assess the completeness of tumour excision and frozen

section and Moh's micrographic techniques are in existence only in a handful of centres. The surgeon is often guided by experience and necessary tissue sampling. There is no room for incomplete excision if reconstruction is contemplated. Vascular mapping (either preoperative, by colour Doppler and CT angiography or intraoperatively) adds precision to the reconstruction when perforator flaps or axial pattern flaps are to be raised.

12.6 Conclusion

From the foregoing, it is obvious that the important future role of reconstruction in cancer therapy will be enhanced by public health education, governmental and institutional policies to enable acquisition of equipment necessary for reconstruction and training of other health care providers to boost the efforts of the specialists in that field. Appropriate health funding will enable prompt treatment of those that require reconstruction and thereby improve survival and quality of life.

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