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Plasty of Rounded Skin Defects on Oncological Patients

U.V. Przhedetskiy

Rostov Cancer Research Institute of the Ministry of Health, Rostov-on-Don, Russia

Abstract: Most methods of skin plasty in oncology are based on excision and removal of normal skin fragments to achieve conformity with length of wound edges and to prevent "standing" or "lying" cones. The optimal variant is to remove tumour by circumferential incision with removal of all area of "tumour field" and to form rounded skin defect. Other incisions giving rise to defects of non-rounded form are irrational because of removal of non-compromised skin. The paper presents different methods of plasty of rounded skin defects. These methods are not intended to excise surrounded normal skin to achieve conformity with wound edges and to improve esthetic result.

Key words: Malignant Skin Tumours % Tumour Field % Rounded Skin Defect % Skin Plasty % Perforant Vessels

INTRODUCTION

Despite significant progress in the diagnosis of early forms of malignant tumors of the skin, the number of severe cases is very impressive [1]. The modern concept of oncological treatment of these patients includes the combined or integrated approach, but its main component implicitly recognized surgical. Radical surgical approach leads to tissue defects, which are not always possible to close the wound edges simple convergence. Violent contraction of the skin edges of the wound leads to their necrosis, suture failure and the emergence of long-term healing of wounds In difficult clinical situations, some authors consider not the primary defect plastics and use ADM (Acellular dermal matrix) to cover the wound surface and stimulate the development of granulation tissue [2].

For full recovery of cancer patient is necessary to remove operation resulting defects of the skin and soft tissues, but the solution to this problem today is not part of the traditional complex treatment of cancer patients [3]. However, today we put high demands on the results of treatment of these patients, based on the latest achievements of reconstructive and plastic surgery. Today, little to cure the patient of cancer, it is necessary to ensure not only functional, but aesthetic and psychological rehabilitation. Only such an approach to treatment can be considered humane and the only way to simultaneously solve two seemingly contradictory goals: maximum oncologic radicalism and prevention of anatomical, functional and aesthetic defects.

Ubiquitous routine methods ellipsoidal wide excision of the skin in some cases are unfounded as they contribute to limit the tension of skin edges of the wound and lead to functionally and aesthetically vicious scars. The irony is that when expressed deficiency of skin in the area of the operation, the surgeon at ellipsoidal excision forced to remove intact triangular patches of skin outside the affected area. Moreover, most methods of skin plastics based on excision and removal of disinterested skin fragments of various shapes to meet the geometry and prevention "standing" or "lying" cones.

Today, this tactic may be considered controversial and should advance the fore skin plasty techniques using all the reserves of the surrounding skin, except potentially affected area, to be unconditional removal.

According to the theory of "tumor field" proposed by the British pathologist Willis [4], a malignant tumor arises not from one but from the set located near the cells exposed to oncogenic effects. Author considered apparently healthy tissue surrounding the tumor is potentially dangerous because of the presence of tumor cells in them, or certain changes of homeostasis, predisposing to the development or recurrence of cancer.

Corresponding Author: U.V. Przhedetskiy, Russian Federation, Rostov on Don. Plehanova St., 92, 344000, Russia.

Contemporary views on the formation of the tumor field can be summarized as follows. With the growth of tumor progression seen the reaction of the cellular elements of the stroma and the depth of destruction of its non-cellular components with an increasing number of vessels per unit area compared to the norm. This is particularly evident in the areas of transition from dysplasia to cancer preinvasive and invasive growth starting zone. With increasing distance from the epidermal and vascular changes and the weakening of the connective tissue at each stage of cancer are found in a certain range that are necessary for determining the true field of tumor sizes in each case. Identification of the true boundaries of the field can serve as tumor control radical surgical interventions, as well as provide invaluable help in choosing the most rational volume of intervention. This will avoid unnecessarily broad, female genital mutilation, or vice versa, if necessary, extend them to the required limits.

Therefore, the ideal situation should be recognized when the surgeon is not only completely remove the tumor, but also captures the “tumor field” entirely. The question is only to the extent of “tumor field”. Unfortunately, there is currently no research methods, objectively determining the boundaries of the region in vivo. Our knowledge in this matter to a certain extent empirical and based on the experience of the operations and data onkomorfologicheskih methods. U.S. scientists published the results of their own research, which showed that “the tumor field” skin melanoma limb is 6.1 mm from the visible tumor borders in melanoma in situ and 4.5 mm in invasive its forms, regardless of the depth of invasion [5].

Considering the centrifugal growth of skin tumors can be assumed that the shape of “tumor field” round or rounded, i.e. formed from points spaced from the edge of the visible tumor at more than a certain amount. Therefore be regarded as justified removal of the tumor by a cut in the form of a circle with the removal of the entire area of “tumor field”. This forms a rounded defect skin and underlying tissues. Any other cut, leading to the appearance of defects is not rounded, will be irrational, unnecessary removal of non-compromised due to the skin. In conditions of severe deficiency of skin for plastic closure of wounds, removing healthy portions of the dermis is wasteful and unnecessary. An example of this popular methods presented excision of skin tumors, followed by grafting of the defect (Fig. 1- 3). Red isolated tumor field, shaded areas represent a leaving intact skin.

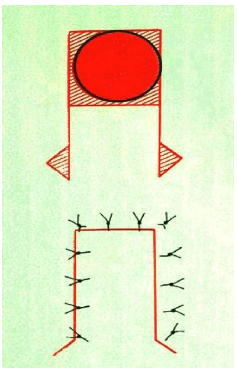


Fig. 1: Excision of skin in the form of a square for the implementation of “U-plasty” by Burian [6]

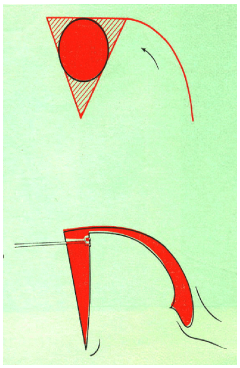


Fig. 2: Excision of skin in the form of an equilateral triangle to implementation plastics rotational flap by Burian [6]

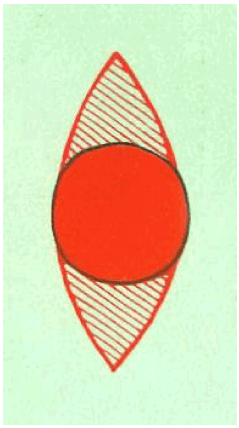
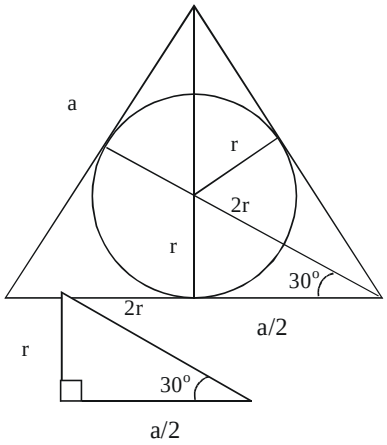


Fig. 3: Simple ellipsoid skin excision arcuate cuts by Burian [6]

In case of excising the skin in the form of a square, the area of the tumor field = 2, the area of excision = (2r) 2 or 4r2. Hence, the difference is 27% area and with the spare triangles Burov is about 40%. When excision of the skin in the form of an equilateral triangle share remote intact skin will be higher.



Because against the angle of 30 degrees is side equal to half the hypotenuse, therefore, by the Pythagorean theorem:

$$(2r)^2 = r^2 + \left(\frac{a}{2}\right)^2,$$

$$4r^2 = r^2 + \frac{a^2}{4},$$

$$\frac{a^2}{4} = 3r^2,$$

$$a^2 = 12r^2.$$

Since the area of an equilateral triangle is $\frac{a^2\sqrt{3}}{4}$

therefore $\frac{12r^2\sqrt{3}}{4} = 3\sqrt{3}r^2,$ where r – radius of the inscribed circle.

Thus, the area ratio of an equilateral triangle inscribed in a circle it is:

$$\frac{3\sqrt{3r^2}}{p\,r^2} = \frac{3\sqrt{3}}{p} = 1{,}66$$

In other words, the area of skin removed irrationally is 66 % of the area required removal. If the triangle is excised any other configuration other than equilateral, the ratio will be even greater.

In the case of an ellipsoidal excision remote area of intact skin may exceed the area of the tumor along with the tumor field (Ratio depends on the radius of the arc-shaped sections).

Based on the above data, it can be argued that the excision circular incision is optimal, both in terms of radical intervention and save the skin.

MATERIALS AND METHODS

We use a number of methods to replace Rounded defects of the skin:

- Crescent-shaped skin flap in a subcutaneous pedicle [7].
- Counter flap of skin- fat flaps (Method JFPick) [8].
- Three-bladed insular flap on a subcutaneous pedicle.
- Counter triangular island flaps on subcutaneous pedicle.
- Counter triangular island flaps on the perforating vessels.
- Fulllayer autodermotransplantation in combination with the imposition of “circular block”.

All of the above methods for closing round defects do not involve excision of surrounding healthy skin to conform to the wound edges and improve the aesthetic result. The first three ways are described in the relevant literature, the last three - developed and proposed by the author.

Crescent-shaped skin flap in a subcutaneous pedicle: Near the defect is cut rounded flap pedicled fat, reminiscent of a crescent or sickle (Fig. 4). Next flap sutured on the concave surface in the line to form an ovoid. The outer edge of the flap formed crosslinked skin primary defect (Fig. 5).

This way we improved (Patent number 2268007 RF). To increase the mobility of the flap, we prosekayut subject muscle fascia and to reduce the load on the joints impose purse string suture (“Round-block”) [9, 10], then tighten it until it touches the edges of the wound. This technique reduces the diameter of the defect reduces the load on the joints persists trophic skin edges of the flap and the quality of the resulting scar.

Counter Flap of Skin-Fat Flaps: On both sides of the defect Molds cut flap of skin-fat flaps towards each other, shifted to the area of the defect and stapled, as shown in Figures 6, 7 and 8.

Counter Triangular Island Flaps on Subcutaneous Pedicle: Cutaneous limb defects are the most difficult for surgical closure due to shortage of plastic material, due to the limited diameter segment, low extensibility and mobility of the skin. Longitudinal excision constrains opportunities surgeon limited diameter segment and

Fig. 4: Melanoma of the skin of the left thigh. Preoperative radiotherapy Partitioning for plastics crescent defect skin graft

Fig. 5: The same patient. Postoperative result after 4 months

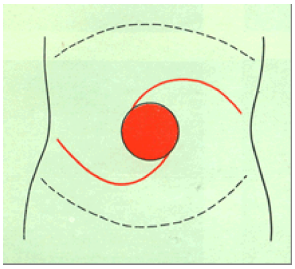


Fig. 6: Plastic spade two flaps by Burian [6]

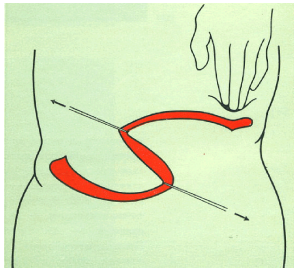


Fig. 7: Moving and adaptation of patches by Burian [6]

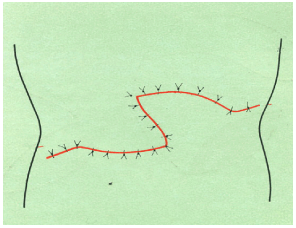


Fig. 8: Form of postoperative scar by Burian [6]

forced convergence leads to the wound edges expressed lymphostasis the lower divisions of the limb. Transverse and oblique excision usually takes at least half of the perimeter segment, damaging the blood and lymph vessels, disrupting cutaneous innervation that, along with a strong tension skin edges are not conducive to good wound healing. Plastic filling postoperative defect enables wider excision of the tumor, thereby increasing the radical surgery.

Traditional methods of plastics under similar conditions in the majority of cases are bankrupt or are associated with prolonged, painful for the patient, multistage surgical interventions (Plastic migratory stem, Italian plastic). Unsuccessful operations in such cases lead to severe anatomical, functional and aesthetic violations, despite the fact that patients are completely cured of cancer.

Description of the method we have met Place *et al.* [11]. On both sides of the defect Molds cut isosceles triangular flaps on subcutaneous pedicle (Fig. 9, 10). To increase the mobility of flaps can dissect subject muscle fascia. Next flaps shifted to the center of the defect, where sewn together (Fig. 11). Sharp corners donor wounds sewn together and there is a “slip” skin islands to the center of the defect (Fig. 12, 13) offset along the length and width. Postoperative results after 14 months.

This method is modified by us to reduce the load on the skin edge flaps. Wherein flaps are displaced not only in length but also the width (Fig.14). Due to this shift flaps along the length is reduced by about 2-fold, respectively, decreases tension of skin edges. 16 patients were operated. Were 2 (12.5%) and 1 edge (6.3%) complete necrosis of the flap in 2 (12.5%) cases, the median scar hypertrophy was observed due to the strong tension of the wound edges.

Three-bladed insular flap on a subcutaneous pedicle: This method is designed (Patented) and us is cutting out three triangular island flaps on adipose stem, arranged around a circular defect angle in 1200. Layout flaps shaped like a propeller with three blades (Fig. 15).

To increase the mobility of flaps we dissect subject muscle fascia angles sew patches in the center of the defect, the distal edge of the donor wounds sewn together. Thus there is a “slip” skin islands to the center of the defect (Fig. 16, 17). The end result is another patient is shown in Fig. 18. 13 patients were operated. Ischemic disorders of the skin was observed.

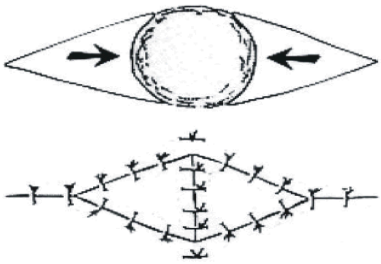


Fig. 9: Schematic depiction of plastic skin and fascial defect shin skin opposing triangular flaps

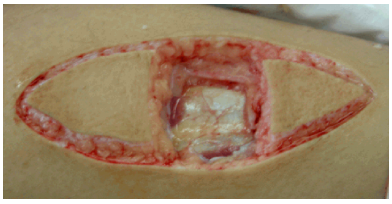


Fig. 10: Plastic defect opposing triangular flaps. step cutting out flaps

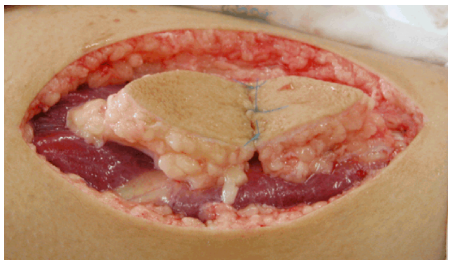


Fig. 11: Plastic defect opposing triangular flaps. Triangular flaps are moved to the center of the wound and stitched together

Fig. 12: View of the surgical field after wound closure

Fig. 13: Plastic postoperative defect of the left forearm counter triangular flaps. Postoperative result after 8 months

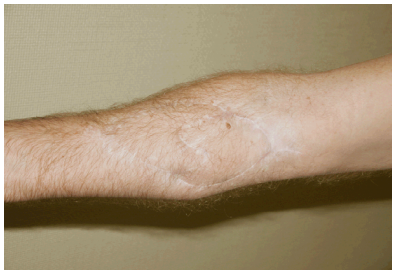


Fig. 14: Plastic defect of the right forearm with opposing triangular flaps

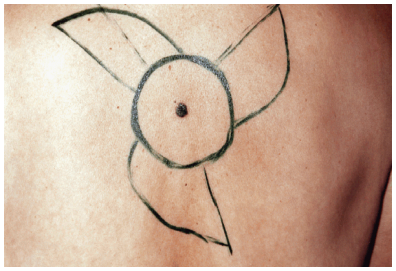


Fig. 15: Melanoma skin back. Preoperative marking for plastic bladed islet graft

Fig. 16: Plastic bladed islet graft. Cutting out the skin flaps on the subcutaneous pedicle

Fig. 17: Plastic bladed islet graft. View of the surgical field posleushivaniya wounds

Fig. 18: Another patient. Plastic bladed islet graft. Postoperative scars after 14 months

Counter Triangular Island Flaps on the Perforating Vessels: The author suggests a method of closing the postoperative limb defects flaps on perforating vessels, allowing to carry out a cross-sectional wide excision with replacement postoperative defect. Flaps, vascularized perforating vessels have high viability, identical in color and texture skin recipient zone. Close proximity to the receiving area contributes minimum deformation of the donor area. When performing this study identified three types of location perforating vessels: Direct epifastsial and fascial. These data are consistent with the work of Tailor and Palmer [12] (Fig. 19).

Plastic performed as epifastsial (Skin and fat) grafts (Fig. 20) and fascial (Skin-fascial) flaps (Figure 21). In both cases, the preoperative period, after a preliminary layout, performed Doppler ultrasound scanner, Doppler perforating vessels in the markup flaps.

Then marked on the skin produced identified perforating vessels (Fig. 22). If necessary, markings future cuts adjusted in accordance with the detected perforator. After excision of the pathological focus, distally and proximally from the resulting defect were cut out curly flaps skin, adipose tissue and in some cases, muscle fascia. Separated by blunt flap from the underlying tissue, while maintaining the integrity of perforating vessels, flaps shifted to the center of the defect, single stitching seams between them (Fig. 23).

From the viewpoint of enhancing the mobility of skin and fascial flaps, more important is the type of arrangement subfascial perforating for cellulocutaneous flaps - epifastsialny. Subfascial mobilization is preferred over epifastsialnoy as it provides greater mobility island flaps, besides fascial tissue separation goes much easier and almost bloodless.

Full layer autodermotransplantation in combination with the imposition of “circular block”: This method is carried out by us traditionally, in accordance with the methods of autologous skin full layer described Krasovitov [13]. The literature describes methods of using double purse-string suture [14]. In our study, to reduce the area on the skin edge autodermotransplant we impose a single purse string suture (“Round-block”), then tighten it to moderate tissue resistance. Maximum tightening purse string suture is not considered appropriate as it leads to severe compression of skin edges with a corresponding violation of their trophics. Node is located under the skin [15- 19]. We also produce skin autograft transplantation. This approach reduces the diameter of the defect and therefore the area of autodermotransplant (Fig. 24, 25).

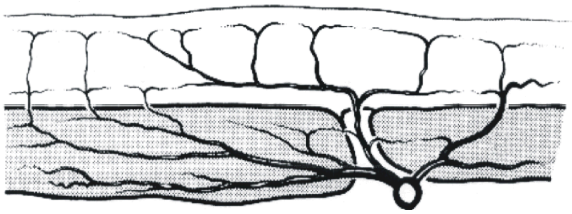


Fig. 19: Schematic depiction of the perforators (at Tailor GI and Palmer GH)

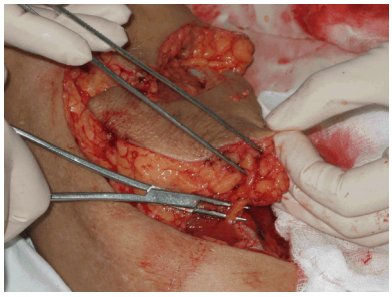


Fig. 20: Perforating vessels (at the terminal) at epifastsial allocation flaps

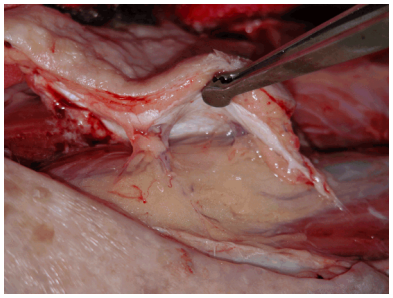


Fig. 21: Perforating vessels with fascial flaps allocation

Fig. 22: Melanoma skin right shin. Preoperative Doppler marking perforating vessels in the flap projection (Marked by crosses)

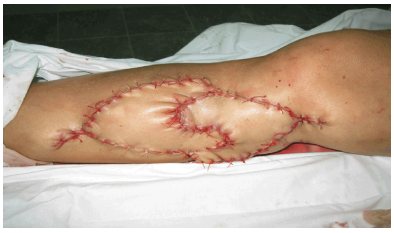


Fig. 23: The same patient. Island flaps on the perforating vessels are sewn with offset length and width

Fig. 24: Melanoma of the skin of the right temporal region. Preoperative marking

Fig. 25: The same patient. The 10th day after tumor excision and autodermotransplantation in the defect with the imposition of a circular block

RESULTS AND DISCUSSION

Using round and round cuts in the surgical treatment of malignant tumors of the skin is the most efficient in terms of oncological radicalism and economical relationship to the surrounding skin, which can be used for plastics arising defect. A considerable number of plastic techniques for closing round or ovoid defects of different shapes cut out flaps, the basis of their blood supply, aesthetic and functional results and so on, but methods based on the use of subcutaneous pedicle flaps moved or perforating vessels are more reliable. In addition, a slight tension wound edges leads to the formation of a thin (Functional) scarring. Formation of flaps based on a random blood supply in some cases leads to ischemia of the past with the result of necrosis. This results in prolonged wound healing with the formation of coarse often hypertrophic scars and aesthetically unfavorable large area. Defect closure autodermoplasty way is simple, but the most unreliable method.

CONCLUSION

Thus, a differentiated approach to the choice of the method of plastic closure of postoperative defect allows excision of large areas of skin, which increases the radical surgery, to minimize the number of complications associated with the tension of the wound edges and a vicious scars, improves the quality of life of patients and accelerate medical and social rehabilitation of patients.

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