

ONCOPLASTIC CONE-SHAPED REMOVAL OF MELANOMA IN SITES WITH LIMITED SKIN RESOURCES

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Background. According to the existing recommendations of the NCCN, 2-cm margins are optimal for surgical excision of skin melanoma (SM).

Objective. A method of cone-shaped oncoplastic surgery of SM in sites with limited skin-plastic resources is presented.

Methods. In the study 30 patients (11 men, 19 women) underwent cone-shaped removal of primary SM on arm and shin, epigastria and subclavicular sites. Oncosurgical approach involves the following: primary SM is excised with 2 cm margins around with transforming this round wound into conical using additional incisions; then conical wound is closed by transverse displacement of lateral skin-fatted flap. The postoperative seam looks like hook-shaped line. SM thickness is measured by sonography before surgery. Morphological verification is obtained by cytological examination of smears after superficial scraping biopsy.

Results. Postoperative histology confirmed melanomas in all cases with "clear margins" in all surgical specimens, and postoperative staging was as follows: pT2bN0M0 – in 3 patients, pT2bN1-2M0 – 4 patients, pT3bN0M0 – 9 patients, pT4bN0M0 – 7 patients, and pT4bN1-2M0 – in 7 patients. Partial marginal necrosis of displaced flaps was of 4 patients (13.3%). There were no recurrences of melanoma at site of postoperative scar. 3-years disease free survival (DFS) rate was 76.6%, and 5 years DFS rate – 60.0%.

Conclusions. Cone-shaped radical excision of primary melanoma is an appropriate surgery for patients with SM on the forearms, shoulders, epigastria and subclavicular sites and legs. The one-step oncoplastic radical surgery without intermediate biopsy prevents local recurrence in site of surgery as well as iatrogenic metastasis to regional lymph nodes.

KEYWORDS: skin melanoma; surgical margins; oncoplastic surgery.

Introduction

Surgery of primary cutaneous melanoma is very important because radical surgical elimination of clinically visible melanoma is the main treatment method to which various adjuvant methods are added. Recently, a revolution in the systemic treatment of melanoma took place. Successful development of immuno- and targeted therapies has changed the context of melanoma treatment in general. However, surgical resection is an important treatment consideration even in the systemic therapy era [1-3].

Over the last two decades, a number of clinical studies have been conducted to determine the extent of surgical removal of primary cutaneous melanoma. There was no consensus

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regarding optimal surgical excision margins. The removal limits of a 1-cm versus 3-cm, a 1 vs 2-cm, and 2 vs 4-cm, etc. have been compared. It is established that a 2 cm excision margin of localized cutaneous melanoma is adequate and safe for patients [4-6].

The recommendations by the NCCN in the Principles of surgical margins for wide excision of primary melanoma are the same: if tumor has thickness 1-2 mm – the clinical margins should be 1-2 cm, if thickness 2-4 mm – margins 2 cm, and if thickness >4 mm – margins 2 cm [7]. However, the patients diagnosed with shave and punch biopsy techniques are significantly more likely to have positive margins on the wide local excision specimen [8]. Otherwise, wide excision sites require reconstruction with a skin graft or local flap at all locations, especially the extremities and head and neck. Also, in these

cases the rate of perioperative surgical adverse events increases as well as wound complications [4, 6, 9]. Therefore, oncoplastic surgery for melanoma in areas with limited plastic resources is still relevant.

Thus, a method of cone-shaped oncoplastic surgery of melanoma in sites with limited skin-plastic resources (arm, shin, epigastria and other) is presented in the study.

Methods

A design of radical surgery with full plastic replacement of surgical wound is shown on Fig. 1. When planning the operation, the margins of wide removal of melanoma are marked on the skin with the tumor location in the center of a circle (o') with radius r_1 . A line $o'o$ ($o'o=2.5 r_1$) is drawn along the axis of the limb. The cone is formed by drawing the lines OD and OE . The transverse flap is marking as two adjacent arcs from the base of the cone – one arc of a circle of radius r_2 ($r_2=4/5 r_1$), the second arc of a circle of radius r_3 ($r_3=3/5 r_1$). The cone-shaped melanoma removal procedure is planning within OED figure. Then, the tissue flap separated along perimeter $OEBFAFO$ moves in the oblique-transverse direction towards to the edge (OD) of the surgical wound so that the

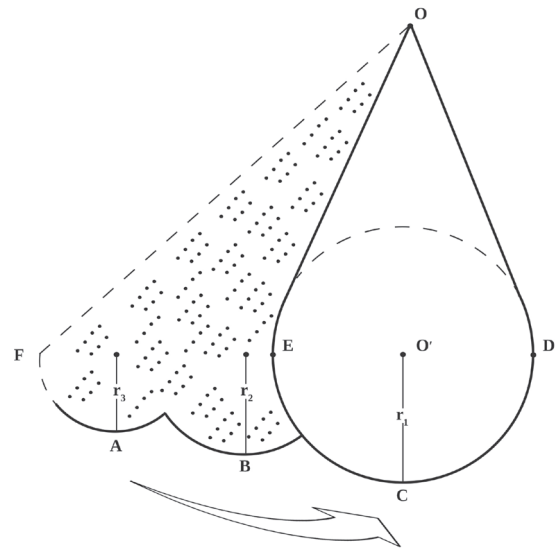


Fig. 1. Surgery design.

flap arc with radius r_2 closes the main surgical wound (r_1), and the flap arc r_3 cover the place of the displaced flap r_2 [18].

The stereometric design of the surgery may vary slightly depending on the location of a melanoma and the volume of soft tissue in the area.

Clinical cases:

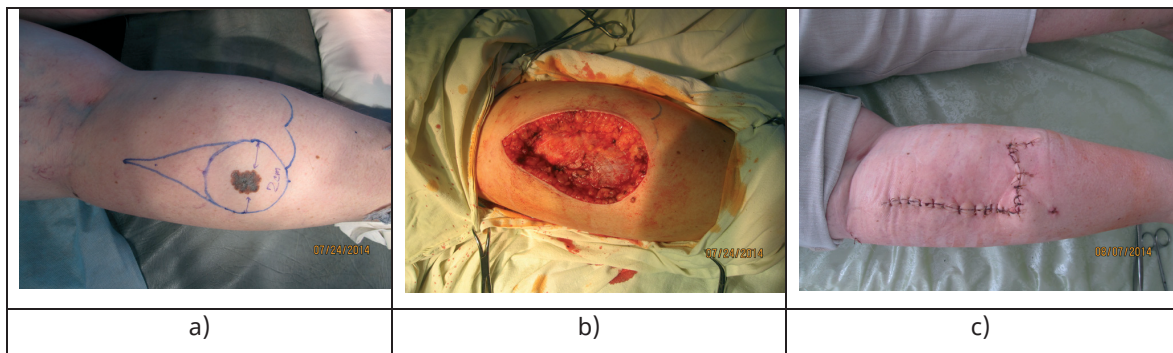


Fig. 2. Patient R., 58 years old, female; skin melanoma pT2bN0M0, stage IIA. Disease free survival (DFS) – 7 years (2014–2021).

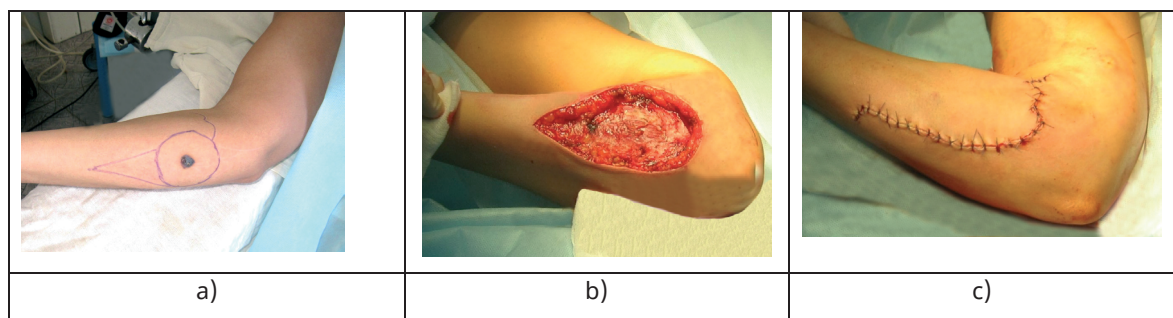


Fig. 3. Patient B., 43 years old, female; Skin melanoma pT2bN2cM0, stage IIIB. DFS – 5 years. (2013–2018).

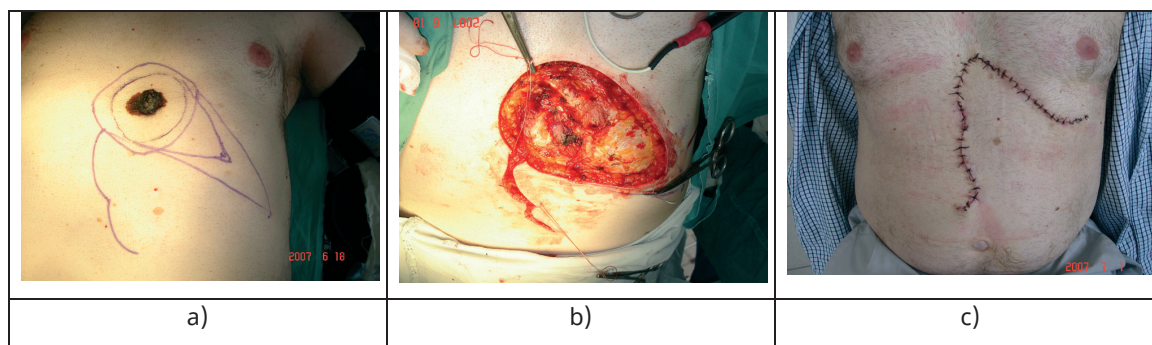


Fig. 4. Patient M., 56 years old, male; Skin melanoma pT4bN0M0, stage IIC. DFS – 9 years (2007–2016); right axillary lymph nodes dissection of melanoma metastases in 2016; no disease recurrence up to the end of 2021.

Cone-shaped operation was performed in 30 patients with primary skin melanoma. There were 11 males and 19 females aged from 30 to 75. The sites of cutaneous melanoma: forearm – 4 cases, shoulder – 5, shoulder joint – 3, epigastria – 3, subclavica – 4, and shin – 11 cases. The study was approved by the Ethical Committee of I. Horbachevsky Ternopil National Medical University, and accordingly, the patients provided a written informed consent.

The algorithm of preoperative diagnosis consisted of clinical evaluation of pigmented lesions, dermoscopy in case of superficial spreading melanomas, and ultrasound measurement of melanoma thickness (*in vivo*) with sonography of regional lymph nodes. Chest/abdomen staging CT was performed for patients with node-positive disease. Morphological verification of melanoma was obtained by superficial scraping biopsy with cytological examination of smears. The preoperative diagnosis of melanoma was consistent with the clinical cTNM classification.

In practice, the surgery is carried out in the way according to Fig. 2a, b. After marking, a scalpel at a distance of 2 cm from the edge of the melanoma cut the skin and subcutaneous fat perpendicularly. The conical skin-fatted flap is removed along with the superficial muscular fascia and then the edges of the wound are mobilized around its perimeter. Next, at the base of the cone with a scalpel an oblique cross-sectional wave with two arcs of larger and smaller radius are made. This skin-fatted flap above the muscular fascia continues to be mobilized, and then the mobilized tissue in the oblique-transverse direction is moved to the opposite edge of the conical wound, sutures and drainage are put. As a result of plastic replacement of surgical wound the hook-like seam occurred; its longer part is located along the axis of the

limb and the shorter one – across it (Fig. 2c). Healing usually takes place by primary tension.

Results

Histological examinations, which were performed after radical surgery, confirm melanomas in all cases. Also, the “clear margins” were confirmed in all surgical specimens. Distribution by Breslow thickness: pT2b – 7 melanomas, pT3b – 9, and pT4b – 14; by Clark’s invasion: level III – in 11 specimens, levels IV – 12, and levels V – 7. Lymph node metastases (N1 and N2) were confirmed histologically after lymph nodes dissection in 11 patients.

Postoperative staging was as follows: pT2bN0M0 – in 3 patients, pT2bN1-2M0 – 4 patients, pT3bN0M0 – 9 patients, pT4bN0M0 – 7 patients, and pT4bN1-2M0 – 7 patients.

Local complications: partial marginal necrosis of the displaced flaps was evidenced in 4 elderly patients (13.3%). There were no recurrences of melanoma at the site of postoperative scar.

A 3-year disease free survival (DFS) rate was 76.6% (23 patients), and a 5-year DFS rate – 60.0% (18 patients).

This method of melanoma removing has shown its effectiveness not only in the extremities, where there is usually a lack of plastic resources, but also in sites where bone contours (e.g., costal arch, clavicle) limit plastic wound closure by the method of Limberg. In general, the method of radical removal of melanoma with the formation of a cone-shaped surgical wound has proven its effectiveness. Despite the fact that a larger surgical wound is formed, it is possible to plastically close this wound with adjacent tissues using their transverse displacement. Thus, this type of radical surgery allows obtaining satisfactory cosmetic and functional results.

Discussion

The discussion about surgical margins of melanoma lasts for several decades including many clinical trials. However, the same methodological principles were inherent for all these clinical studies: biopsy is the first surgery, and next surgery is wide local excision (WLE) of postbiopsy scar. According to the published results and recommendations of the AAD, ESMO and NCCN, the primary melanoma should be removed by excisional biopsy within 1-3 mm from the edge of the tumor using local anesthesia [7, 10, 11]. The WLE is recommended after complete histological examination of the biopsy-removed melanoma. Moreover, it takes 4-6 weeks between two surgeries. In our opinion, the second surgery at distance 2.0 vs 4.0 cm (or 1 vs 3 cm) has nothing with melanoma for the simple reason that it (melanoma) has already been removed 4-6 weeks earlier. In fact, the linear post-biopsy scar is excised during the second operation. Usually the pathologist does not detect signs of melanoma in fresh scar tissue.

Thus, with this methodological approach, we can predict that results of treatment will not differ. Indeed, there were no significant differences in melanoma-specific and overall survival of the patient groups comparing the wide (3-5 cm) and narrow (1-2 cm) margins of biopsy-scar removing. The overall local recurrences including in-transit metastases were remarkably similar between 1 cm and 3 cm groups [4, 5, 9, 12, 13].

Such data were obtained in most clinical studies from 2001 to 2019. This creates illusion that the surgical margins for removal of primary melanoma do not matter (2.0 or 4.0 cm; 1.0 or 3.0 cm), because the survival rate in the comparative groups is just about the same [4, 6, 12, 14, 15]. However, in 20-35% of patients with stage II melanoma ($pT2b$, $pT3a/b$, $pT4a/b$) metastatic lesions in regional lymph nodes were evidenced during the second surgery [4, 16, 17], which indirectly confirmed the fact that excisional biopsy may affect development of locoregional metastases.

Our clinical study shows the true surgical margins in excision of primary melanoma. In these cases, the term *oncosurgical* is used to refer the one-step radical removal of skin melanoma compare to the dermatological approach [19].

What do we gain from the *oncosurgical* approach? The first surgery with full plastic replacement of surgical wound becomes a radical surgery of primary melanoma. We get rid of two-stage surgery with an interval of 4-6 weeks; the time of treatment is reduced, which has a positive effect on the emotional state of the patient.

Primary WLE of melanoma most likely involves microsattellites; that is why there were no recurrences at the postoperative scar in the study, while the incidence of local recurrence for shave, excisional, incisional, and punch biopsy was 4.9%, 6.5%, 14.3%, and 6.1 % respectively [8]. In addition, primary WLE decreases the iatrogenic dissemination of malignant cells into regional lymph nodes compare to excisional biopsy under local anesthesia. However, the careful ultrasonic monitoring of the regional lymph nodes should be carried out during the follow-up of these patients.

Conclusions

This clinical experience shows that cone-shaped radical excision of cutaneous melanoma is a reasonable surgery for patients with melanoma on the forearms, shoulders, epigastria and subclavicular sites and legs.

From the edge of the primary melanoma it is necessary to make a 2 cm marking for a wide local excision of this melanoma. The one-step oncoplastic radical surgery of primary melanoma without the intermediate biopsy prevents local recurrence in the site of surgery and also it prevents iatrogenic metastases to regional lymph nodes.

Decision making for radical resection of primary skin melanoma may be based on its cytological verification and ultrasound measurement of melanoma thickness *in vivo*.

Conflict of Interests

The author declares no conflict of interest.

РАДИКАЛЬНЕ КОНУСОПОДІБНЕ ВИДАЛЕННЯ МЕЛАНОМИ В МІСЦЯХ З ОБМЕЖЕНИМИ ПЛАСТИЧНИМИ РЕСУРСАМИ ШКІРИ

І. Й. Галайчук

ТЕРНОПІЛЬСЬКИЙ НАЦІОНАЛЬНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ ІМЕНІ І. Я. ГОРБАЧЕВСЬКОГО МОЗ УКРАЇНИ,
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Вступ. Відповідно до існуючих рекомендацій NCCN, 2-сантиметрові краї резекції є оптимальними для хірургічного видалення меланому шкіри (МШ).

Мета. Представити хірургічну методику радикального конусоподібного видалення меланому в місцях з обмеженими пластичними ресурсами шкіри.

Методи. У 30 хворих (чол. – 11, жін. – 19) застосовано методику конусоподібного видалення первинної МШ, локалізованої на верхніх і нижніх кінцівках, епігастрії та підключичних ділянках. Методика операції полягала в тому, що МШ вирізали з 2-см краями резекції навколо, утворену округлу операційну рану за допомогою додаткових розрізів перетворювали в конічну. Пластичне закриття конічної рани здійснювали шляхом поперечного зміщення бічного шкірно-жирового клаптя. Після пластики рани утворювався гачкоподібний післяопераційний шов. Перед операцією товщину МШ вимірювали за допомогою УЗД, а морфологічну верифікацію отримували шляхом цитологічного дослідження мазків з поверхні меланому.

Результати. Післяопераційні гістологічні дослідження підтвердили наявність меланому в усіх випадках із «чистими краями резекції» у всіх хірургічних зразках. Були встановлені наступні стадії захворювання: pT2bN0M0 – у 3-х хворих, pT2bN1-2M0 – 4 хворих, pT3bN0M0 – 9 хворих, pT4bN0M0 – 7 хворих і pT4bN1-2M0 – 7 хворих. Частковий крайовий некроз зміщених клаптів був відмічений у 4 хворих (13,3%). Рецидивів меланому в ділянці післяопераційного рубця не було протягом часу спостереження. 3-річна безрецидивна виживаність становила 76,6%, а 5-річна – 60,0%.

Висновки. Радикальне конусоподібне висічення первинної меланому є доцільним хірургічним втручанням у хворих з локалізацією МШ на передпліччях, плечах, епігастрії та підключичних ділянках і гомілах. Одноетапна онкопластична радикальна операція без проміжної біопсії унеможливорює виникнення локального рецидиву меланому в ділянці операції, а також запобігає ятрогенному метастазуванню в регіонарні лімфатичні вузли.

КЛЮЧОВІ СЛОВА: меланома шкіри; краї резекції; онкопластична операція.

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