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Original Article

Clinical effect of full-thickness skin grafts for the treatment of large and giant congenital melanocytic nevus on the face and extremities joints in children

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Abstract: Background: The surgical treatment of large and giant congenital melanocytic nevus (CMN) presents a great challenge. There is no consensus regarding the optimal surgical management. The purpose of this study was to assess the clinical effect of full-thickness skin grafts to repair defects after removal of the large and giant CMN on the face and joints region. Methods: Between March 2012 and July 2015, 20 patients with the large and giant CMN underwent surgical excision of these lesions and closured the defects with full-thickness skin grafts harvested from the lower abdomen. The data on patient demographics, general medical history, excised pathology, graft take, observation of complications and follow-up was analyzed. Results: The mean age was 3.8 years (range, 6 months-9 years). These lesions were located on the face (30%), neck (20%), elbow (20%), hand (15%), knee (5%), foot (10%). The mean area of excised lesions was 136.8 cm^2. The mean graft take was 93%, ranging 80% from 100%. 4 patients lost approximately 3%-10% of the graft. Multiple small remaining defects were treated with split-thickness skin graft harvested from thigh. Hypertrophic scarring occurred at the edges of the graft in 3 patients. The mean follow-up time was 1 year (range from 6 months to 2 years). Conclusion: Full-thickness skin grafts is an effective method of repairing the defects resulting from the removal of large and giant nevus on the face, neck, elbow, hand, knee, foot, particularly where there is limited availability of normal adjacent skin for tissue expansion.

Keywords: Large and giant congenital melanocytic nevi (CMN), full-thickness skin grafts, the face and joint area, clinical effect

Introduction

The large and giant congenital melanocytic nevus (GCMN) is defined as a rare type of melanocytic nevus involving more than 2% body surface area in infants and toddlers or a diameter greater than 20 cm in adults [1, 2], which presents at birth and can affect any site of the total body surface area such as head, limbs and torso [2-4]. Although the incidence of the large and giant CMN is rare (1/20,000-1/500,000 births) [5-7], it has the potential risk of malignant degeneration and causes aesthetic concerns. The accurate incidence of melanoma arising in large and giant CMN is difficult to be established and estimated in the literature between 5% and 10% over a lifetime [8]. Early excision of the large and giant CMN is recommended for decreasing the risk of developing melanoma [9, 10] and ameliorating disfigurement [11], reducing the associated psychological distress. However, reconstruction approaches after the removal of these lesions present a great challenge depending on various lesion sizes and different anatomic locations.

Some cosmetically sensitive areas such as face, ear, neck and special anatomical locations including elbow, hand, knee, foot with highly visible nature and daily activities allow for superior skin coverage to reconstruct the defects after the excised nevus. A multitude of surgical methods to repair defects of the excised area have been described including tis-

Figure 1. A: Preoperative view of a 3-year-old male patient who presented with a giant congenital melanocytic nevus of left cheek and left ear and treated by excision with a full thickness skin graft. B: Postoperative view at 4 months after excision of facial lesion following first operation. C and D: Postoperative view at 2 years after excision of auricular lesion following second surgery.

sue expansion, split-thickness skin graft and full-thickness skin graft. In recent years, tissue expansion is well recognized as a good technique of resurfacing the giant circumferential defect created after nevus excision and could achieve both functional and aesthetic outcome [12-14]. However, the tissue expansion has a higher complication rate and more limitations than full-thickness skin graft, particular in extremities [2, 15]. Some studies have demonstrated that full thickness skin grafts (FTSGs) repairing defects of the face, neck, and dorsum of feet results in soft, pliable, functional skin with minimal contraction. The reconstruction method with full-thickness skin graft versus split-thickness skin graft could provide more durable and better aesthetic results and exhibit minimal contraction [16-18]. But its major limitation is the scarcity of harvesting areas for autologous skin grafts. Nowadays, full-thickness skin graft for repairing the defect of the excision of the large and giant CMN on the face, ear, neck, elbow, hand, knee and foot has not been extensively evaluated in the literature.

In this article, we present our experience with a large series of patients who were reconstructed with full-thickness skin graft harvested from the lower abdomen or groin to cover the excised area over the face, ear, hand, foot, elbow or knee joint and further evaluate the long-term functional and aesthetic results through clinical follow-up.

Patients and methods

20 patients with large and giant CMN underwent reconstruction with full-thickness skin grafts following the removal of these lesions in our plastic surgery between March 2008 and July 2015. There were 6 patients with lesions on the face, 4 patients with lesions on the neck, 4 patients with lesions on the elbow, 3 patients with lesions on the hand, 1 patient with lesions on the knee and 2 patients with lesion on the foot. These lesions in 8 patients were of a circumferential nature with limited availability of normal adjacent flap skin. The data on patient demographics, excised pathology, general medical history, donor site was reviewed.

The surgical procedures were performed under general anesthetic in all patients. 6 patients had completely excision of large and giant CMN

Figure 2. A: Preoperative view of a 3-year-old female patient who presented with a giant congenital melanocytic nevus involving left cheek, ear and scalp, treated by excision with a full thickness skin graft. B: Postoperative view at 5 months after excision of facial lesion following first operation. C: Postoperative view at 2 years after excision of auricular lesion following second surgery.

Figure 3. A: Preoperative view of a 8-year-old female patient who presented with a giant congenital melanocytic nevus involving the neck, scalp and back. B: Postoperative view at 6 months after reconstruction with full-thickness skin graft from the lower abdomen. C: Postoperative view at 1.5 years following second surgery.

at one procedure. 14 patients required two procedures to remove these lesions. In the first procedure, the lesion on the joint region was excised to the underlying fascial level. The full-thickness skin graft was harvested from the lower abdomen and had the same size as the

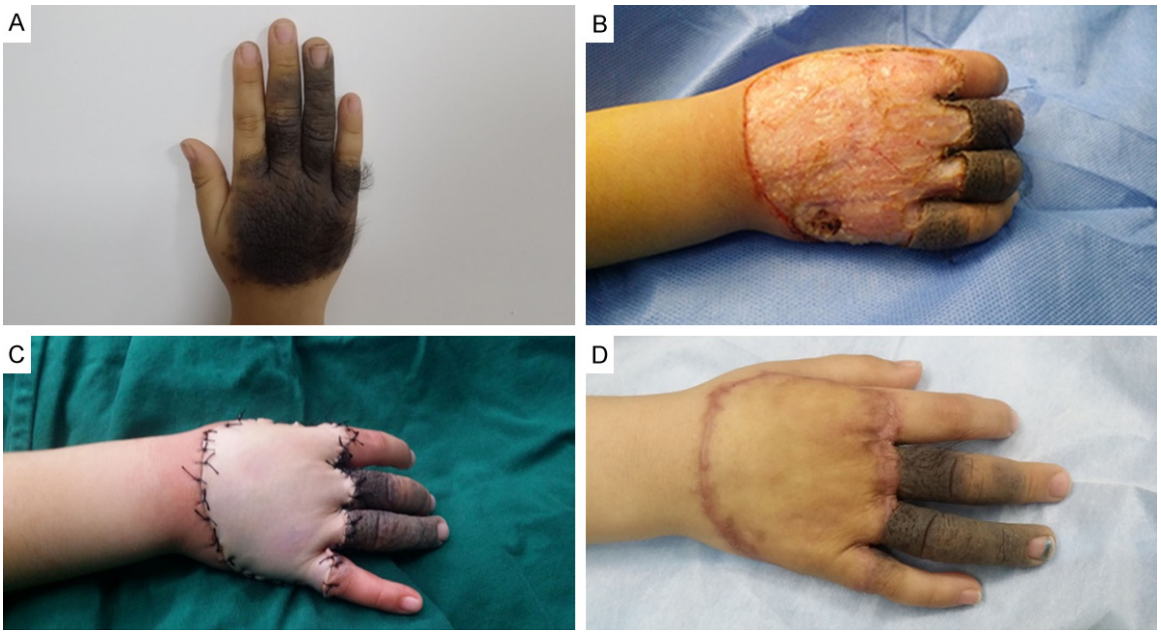

Figure 4. A: Preoperative view of a 9-year-old female patient who presented with a large congenital melanocytic nevus of the dorsal hand and treated by excision with a full thickness skin graft from the lower abdomen. B: The defect after the excision of large CMN. C: After the excision of the nevus, the resulting defect was covered with the full-thickness skin graft by securing at the edge of the defect with 4.0 sutures. D: Postoperative view at 9 months following the surgery.

excised area. Subsequently, the resulting defect was covered with the full-thickness skin graft by securing at the edge of the defect with 4.0 sutures. In the process, meticulous haemostasis was acquired by selective electrocoagulation in the excised area and immobilization was performed postoperatively. The operative sites of all patients were dressed with wet cotton bolsters and subsequently wrapped with elastic bandages in patients with large CMN in the extremities. All patients received postoperatively prophylactic antibiotics (first generation Cephalosporin). The characteristics of wound care and healing was noted. Preoperative and postoperative digital photographs were taken for all patients to evaluate the long-term outcomes through follow-up.

The study was approved by the Ethics Committees in the Third Affiliated Hospital, Henan University of Science and Technology, Luoyang, China.

Result

20 patients with large and giant CMN were reviewed in the study, including 8 female and 12 male patients. The mean age was 3.8 years, ranging from 6 months to 9 years. These lesions were located on the face (30%), neck (20%), elbow (20%), hand (15%), knee (5%), foot (10%).

The size of excision of large and giant CMN was ranging from approximately 4×7 cm^2 to 8×19 cm^2 (**Figures 1-6**). The histopathologic examination of the excised specimen showed no evidence of melanoma in all patients. The full thickness skin graft was harvested from unilateral lower abdomen in all patients. After two weeks, the mean graft take was 93%, ranging 80% from 100%. 4 patients lost approximately 3%-10% of the graft. Multiple small remaining defects were treated with split-thickness skin graft harvested from thigh. Hypertrophic scarring occurred at the edges of the graft in 3 patients. Two patients had hypertrophic scar in the donor site.

The mean follow-up time was 1 year (range from 6 months to 2 years). The follow-up outcome of all patients revealed that all of them got acceptable cosmetic and functional results and none of them developed melanoma.

Discussion

Taking into consideration the potential risk of developing melanoma and disfigurement result-

Figure 5. A: Preoperative view of a 1-year-old male patient who presented with giant circumferential nevus involving the left shoulder joint the left upper arm, excluding the hand. B: Postoperative view at 3 months following the lesion treated by excision with a full thickness skin graft from the lower abdomen. C: Postoperative view at 10 months following second surgery.

ing from the large and giant CMN, early prophylactic excision and reconstruction of these lesions was advised [3, 19]. The surgical approaches for the treatment of large and giant CMN represent a challenge depending on various size and different location of these lesions, particularly in the joint region. In our study, we present our experience with full-thickness skin graft to reconstruct the defects of excision of large and giant CNM after thorough discussion with family members as to surgical risks and benefits and malignancy potential.

Recent advances have led to a multitude of the surgical approaches for the treatment of large and giant CMN including tissue expansion, serial excision, and either full-thickness or split-thickness skin grafts. However, none of the currently available surgical method is universally accepted Tissue expansion is a useful method for providing additional tissue to resurface the giant defect created after the removal of nevus and acquires functional and aesthetic outcome. However, the complications and limitations of tissue expansion are commonly described and are often reported to be greater in children [14, 15]. Major complications of expansion include infection, expander exposure, implant failure [20]. Besides, the tissue expansion applied in patients with large and giant CMN requires multiple stages and increases the morbidity of the elbow or knee joints. Serial excision is a preferred treatment method for CMN that can be excised in not more than two procedures [21]. But it is not recommended for large lesions involving the face, ear, neck, circumferential extremity, as it avoids the distortion of involved or adjacent structures and function loss. In above anatomic sites, skin grafting is recommended. Full-thickness skin grafts versus split-thickness skin grafts are preferred for the reconstruction of the face, ear, neck, elbow or knee joints, hand and foot. Full-thickness skin grafts applied in the use of repairing defect created after excision of nevus and the grafted skin had the excellent contour, color match, texture and thickness [22, 23]. In present study, 20 cases of skin graft healed well and the take rate of full-thickness skin graft ranged 80% from 100%. A little graft skin loss occurred in 3 patients. The donor area range in 12~24 cm and was closed primarily when its diameter less than 10 cm, resulting in the low incidence of donor site morbidity and a favorable linear scar. Graft and donor site-related complications were infrequent. Most patients (85%) are left with a favorable linear scar and do not have donor or recipient site morbidity, and are not subjected to potential tissue expander complications.

There were some limitations that we acknowledged in our study. First, the major limitation was the scarcity of harvesting areas for autologous skin grafts. Therefore, we design two procedures to completely removal the large and

Figure 6. A: Preoperative view of a 3-year-old male patient who presented with a giant congenital melanocytic nevus of the dorsal foot and treated by excision with a full thickness skin graft from the lower abdomen. B: The defect after the excision of large CMN. C: After the excision of the nevus, the resulting defect was covered with the full-thickness skin graft by securing at the edge of the defect with 4.0 sutures. D: Postoperative view at 1 years following the surgery. E and F: Postoperative evaluation 1 year after full-thickness skin grafting. The skin is soft and pliable.

giant CMN. In the first stage, we used full-thickness skin graft to repair the defects of the excised nevus on the face, ear, neck, elbow and knee joints, hand and foot. In the second procedure, we plan to excise the remaining nevus and reconstruct with split-thickness skin graft harvested from the scalp. Second, pigmentary mismatch resulting from skin harvested from the abdomen, may occur in some patients. In addition, our sample size was small. The reconstruction with full thickness skin graft after removal of nevus need to be further evaluated in prospective studies of a large sample sizes.

Conclusion

Full-thickness skin grafting is a safe and effective method to repair the defects of the excised area over the elbow or knee and get a satisfactory cosmetic and maintain proper function and reduce the risk of degeneration. It is unfortunate to note that malignant transformation may occur in the excised area of the large and giant CMN because of the presence of the remaining immature melanocytes in subcutaneous tissue, fascia or underlying muscle. In order to detect and treat aggressively any early or late

occurrence of malignancy, it is imperative to monitor these patients long-term by close follow-up with a systematic clinical examination.

Disclosure of conflict of interest

None.

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