Transposed skin graft for wound closure after Cincinnati incision

Experience in 7 patients with severe foot deformities

Marek Napiontek

I report a technique of wound closure by a transposed skin graft after operative treatment of foot deformities, using a Cincinnati incision. Three-dimensional correction of severe foot deformities (congenital talipes equinovarus, congenital vertical talus, etc.) results in skin excess on one side of the foot and lack of this on the opposite side. The skin excess can be cut out and used as a full-thickness skin graft for wound closure on the opposite side of the foot.

Department of Pediatric Orthopedics, Institute of Orthopedics and Rehabilitation, ul. 28 Czerwca 1956 nr 135/147, PL-61-545 Poznan, Poland. Tel +48 61-310 360. Fax -334 421
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The Cincinnati incision is used for surgery of congenital talipes equinovarus (CTEV), congenital vertical talus (CVT) and other foot deformities (Crawford et al. 1982, Krauspe and Parsch 1995). In most of the feet operated on using this incision, one can close the wound primarily. However, in older children and with severe deformities, wound closure problems arise when using this approach. I describe a solution to this problem.

Patients and methods

Three-dimensional correction of the foot, using the Cincinnati incision, results in a skin fold on its dorsolateral (CTEV) or anteromedial (CVT or congenital absence of the fibula) aspect. The skin excess is commonly removed. I used this full-thickness skin fragment as a graft for wound closure on the opposite side of the foot. The skin excess was cut out with scissors, multiple-stab incised and transposed on the opposite side of the foot. A pressure dressing with vaseline on the graft and an above-knee plaster cast were applied. After 2 weeks, the sutures were removed and another above-knee plaster cast was applied for 4 weeks. 6 weeks after the operation, the K-wires were removed and the child walked in a below-knee plaster cast for 6-8 weeks (Figure 1).

The transposed skin graft was used in 9 feet in 7 children operated on in 1994–1995. The patients' mean age was 2 (1–4) years. 6 feet had idiopathic CTEV treated with complete subtalar release. In 2 of them the skin graft was used at reoperation (Figure 2). Another foot presented with an equinovarus deformity and congenital absence of the tibia, another 2 had an equinovalgus deformity and congenital absence of the fibula. The child with congenital absence of the tibia underwent centralization of the fibula and, in a second stage a realignment of both the foot and fibula by soft tissue release around the talus. In the patient with congenital absence of the fibula, after the osteotomy that corrected the anteflexion of the tibia, the release around the talus and realignment of the foot and tibia were done as well. In every case, the surgical approach to the foot was the Cincinnati incision.

Results

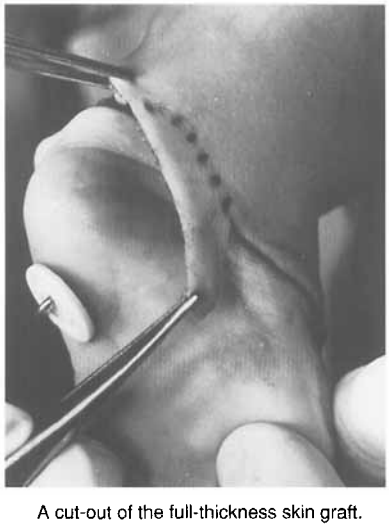
In 7 feet, the wound healed primarily. In 2 feet, in the oldest child with neglected CTEV, the grafts were rejected, but the wound healed per secundam without problems. The scar was narrow and regular.

Discussion

Primary skin closure after surgical correction of severe congenital foot deformities may be difficult or even impossible, especially in revision surgery. Closure of the wound often impairs the correction obtained at surgery because of reduced vascularization of the skin and recurrence of the deformity. Accepted methods of wound management, described for CTEV were used in the above-mentioned cases: primary closure of the skin in the undercorrected position, the wound may be left partially open to heal secondarily (Breed 1994), forming a myocutaneous

Figure 1. Equinovalgus deformity of the left foot in a 21-month-old girl with congenital absence of the fibula.

Skin excess as an effect of three-dimensional correction of the foot.



A cut-out of the full-thickness skin graft.

Figure 2 Neglected congenital talipes equinovarus in a 10-month-old girl operated on with posteromedial release at age 6 months.

Clinical appearance of the foot before reoperation. Typical neurological picture of the foot after "Z-plasty" of the tibialis posterior nerve made by an inexperienced surgeon.

Immediately after complete subtalar release with the Cincinnati incision. Transposed skin graft from lateral side, subcutaneous flap (additional incision on posteromedial side) and "Z-plasty" of the skin for covering the medial part of the wound.

Result 6 months later.

or fasciocutaneous flap (Lehman et al. 1987), posteromedial "looped" incision (Gould 1988), use of tissue expanders (Atar et al. 1990, Grant et al. 1994) and simple "Z plasty" of the skin. Dega (1956) employed a lateral release and transposition of a subcutaneous flap. Bethem and Weiner (1978) described a similar procedure with a rotational full-thickness skin-flap with a graft on the lateral side of the foot. Failure may be caused by excessive thickness and callosity changes of the grafted skin. Moreover, the survival of the graft depends on the vascularity of the background. Tendons, their sheats and the neurovascular bundle should be covered by subcutaneous tissue.

In my experience, the technique of the transposed

skin graft may be recommended for all children after three-dimensional correction of severe foot deformities, especially in cases with extreme varus or valgus deformity.

References

Atar D, Grant A D, Silver L, Lehman W B, Strongwater A M. The use of a tissue expander in club-foot surgery. J Bone Joint Surg (Br) 1990; 72: 574-7.

Bethem D, Weiner D. Radical one-stage posteromedial release for the resistant clubfoot. Clin Orthop 1978; 131: 214-23.

Breed A L. Partial wound closure following clubfoot surgery. In: The clubfoot. The present and a view of the future (Ed. Simons G W). Springer Verlag, New York 1994: 241-4.

Crawford A, Marxen J L, Osterfeld D L. The Cincinnati incision, a comprehensive approach for surgical procedures of the foot and ankle in childhood. J Bone Joint (Am) Surg 1982; 64: 1355-8.

Dega W. Zaopatrywanie ubytków skóry po operacyjnej redresji stopy koñsko-szpotawej wrodzonej (The covering of a skin defect after operative correction of talipes equino-varus). Chir Narz Ruchu Ortop Pol 1956; 21: 293-5.

Gould J S. Clubfoot. In: The foot book (Ed. Gould J S). Williams & Wilkins, Baltimore 1988: 153-72.

Grant A D, Atar D, Lehman W B, Strongwater A M. The use of tissue expanders in clubfoot surgery. In: The clubfoot. The present and a view of the future. (Ed. Simons G W). Springer Verlag, New York 1994: 235-41.

Krauspe R, Parsch K. Die peritalare Arthrolyse zur Klumpfußkorrektur über den sogenannten Cincinnati-Zugang. Operat Orthop Traumatol 1995; 7: 125-40.

Lehman W B, Silver L, Grant A D, Strongwater A M, Weg O. The anatomical basis for incisions around the foot and ankle in clubfoot surgery. Bull Hosp Jt Dis Orthop Inst 1987; 47: 218-27.