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Case report

Simplified management of a giant forehead congenital nevus allows for early reconstruction

Moris Topaz,¹ Michael Gurevich,² Itamar Ashkenazi ³¹Hillel Yaffe Medical Center, Hadera, Israel²Transplant Unit, Schneider Children's Medical Center of Israel, Petah Tikva, Israel³Surgery Department, Rambam Health Care Campus, Haifa, Haifa, Israel**Correspondence to**Dr Moris Topaz;
mtopazmd@yahoo.com

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SUMMARY

We report simplified surgical management of giant congenital forehead nevus that customarily requires the use of tissue expander for complete excision. Commencing treatment at the age of 3 months, the TopClosure tension relief system (TRS) was applied as an external tissue expander allowing preoperative skin stretching by mechanical creep. This was followed by partial excision of the nevus. Intraoperative stress-relaxation allowed further expansion of the skin. Postoperative wound closure was secured with the aid of the TRS. Repeated, six simple staged excisions of the forehead lesion and a minor skin graft to the eyelid part, allowed for delayed primary closure of the entire lesion by the age of 2. This simple alternative approach, which allows the early start and early conclusion of the reconstructive process, should be considered as the primary option in the treatment of these patients.

BACKGROUND

Removal of giant congenital nevi of the face poses a substantial challenge to the reconstructive surgeon, impaired body image, stigmata and traumatic reconstructive experience for the patient, emotional and social burden to the close family and economic load to the medical community. Traditionally, the reconstructive course starts with surgical implantation of tissue expanders at the age of 3 or older following the maturation of the scalp bones to avoid bone depression through the inflation sequence of the tissue expander. The inflation of the device may last for months and may be associated with substantial inconvenience and morbidity. In this case report, we describe a method that allows starting the surgical treatment at an early age and enables the complete resection of the lesion in a simplified manner that is more comfortable to the child. Reconstructive surgeons facing similar patients should be aware of this simple alternative technique, which allows early start and conclusion of the reconstructive process.

CASE PRESENTATION

This otherwise healthy new-born presented following his birth with a giant nevus (8×10 cm) of his forehead ([figure 1A](#)). After reviewing the traditional optional management paths including skin graft and tissue expander, the option for early staged excisions applying the TopClosure tension relief system (TRS) (IVT Medical, Ra'anana, Israel) was chosen as the preferable mean for a simple reduction of the lesion size.¹ Due to the major

aesthetic deformity and the social implications, the family was eager to start the reconstructive process early. A paediatric follow-up of the child revealed normal development. Since our plan included performing simple excision only, with expected minimal bleeding, the first surgery was scheduled at the age of 3 months.

TREATMENT

One-week before surgery, horizontal gradual stretching was performed by applying two sets of TRS on both sides of the lesion ([figure 1B](#)). Further elongation of the skin by mechanical creep was achieved by increasing the stretching load every other day in the outpatient clinic. This was followed by stage excision under general anaesthesia. The medial part of the lesion was excised sparing the underlying galea ([figure 1C](#)). Wound edge vascularity was maintained by avoiding undermining of the skin. Pulling on the TRS strap allowed for an easy approximation of the wound edges. The complete approximation was achieved by applying deep Monocryl 3.0 sutures enabling wound closure with practically no dead space, with minimal bruising and swelling postoperatively ([figure 1D](#)). Wound closure was secured by the TRS until complete healing. Six weeks after surgery another cycle of preoperative wound stretching was started. This was followed by an additional excision performed about 2 months following the first surgery, repeating the same surgical procedure ([figure 2A–C](#)). A total of six cycles of skin stretching and excisions were required for total excision of the nevus including a minor skin graft that was applied at the medial cantus.

OUTCOME AND FOLLOW-UP

Excision of the entire nevus was achieved early, before the age of 2 ([figure 2D](#)). Minor superficial pigmentations at the edges of the excision still require follow-up. If needed, further surgery could be performed by excision and primary closure.

DISCUSSION

One per cent of newborns suffer from melanocytic nevi.² However, the overwhelming majority of these are small. Giant nevi involving the forehead are uncommon. Their position on the face represents a pathology with major psychological, well-being and psychosocial functioning obstacles for both the child and his close family. The impaired self-image may lead to behavioural and emotional



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Figure 1 Stage excision of a giant nevus of the forehead by the TopClosure tension relief system, initiated at the age of 3 months. Skin defect closure was facilitated by preoperative skin stretching and postoperative closure secure.

problems and social maladaptation if left untreated.³ These may be alleviated or avoided by surgery done at an early age.

Malignant transformation of facial melanocytic nevi into malignant melanoma has been described.⁴ The malignant potential is dependent on the size of the lesion and is more common in patients with huge nevi covering most of the facial skin rather than just the forehead. In patients similar to the one described here, the potential for malignant transformation is considered to be low, maybe 0.8% over the years.^{4,5} Nevertheless, apart from cosmetic considerations, the presence of nevi makes it difficult to identify early malignant transformation.⁶ It is for these reasons,



Figure 2 Additional stages of excision with the final result before the age of 2 years.

most opt for resection if possible as long as the procedure is not accompanied by significant untoward effects on the face.

The timing of resection is controversial. Those opting to operate early, within the first eighteen months, rationalise the urgency of removal on the negative impact on body image that affects the psychological and psychosocial outcome imposed by the nevus deformity and the memorable traumatic, lengthy reconstructive process. They also rely on the potential for malignant transformation of these lesions if left untreated until an older age. Those opting to operate later rely on the observation that the potential for malignant transformation for most of these lesions is low. Other justifications for delaying the surgery include the risk for temporary and even permanent cranial deformation by inserting the tissue expander before 18 months of age and the physiological impact of bleeding being more significant in the very young patient.⁷ Anaesthesia is safer as the child grows and the lesion may brighten up, limiting the scope of resection.⁸

In order to close skin defects primarily following resection of large facial melanocytic nevi, the surrounding skin needs to be expanded. This can be achieved by two different mechanisms. The first mechanism is stress relaxation. Basically, the skin is gradually expanded by pulling on it during surgery. Some authors describe the insertion of the balloon reservoir of a Foley catheter following the development of a subcutaneous pocket located deep in the forehead skin surrounding the lesion that needs to be resected.⁵ The reservoir is then inflated with saline until the skin above it becomes blanched. After several minutes the balloon is deflated, only to be inflated again with an increasing amount of saline. This procedure is repeated several times, each time, with an increasing volume of saline. The mechanism of stress relaxation allows enough expansion of the skin around the lesion to allow closure of a defect created following the resection of a lesion up to 3 cm. In order to expand the facial skin enough to cover larger defects, these patients usually need either serial excisions using the same method of expansion as described above, or another type of reconstruction.⁹

The second mechanism is mechanical creep. The constant load applied to the skin over weeks allows for elongation of the skin beyond its inherent extension.¹⁰ This comes about by rearrangement of the collagen fibrils.¹¹ The concept of mechanical creep forms the basis for the use of tissue expanders inserted under the skin. In these cases, the expander is inserted under healthy skin which will be used later to cover the skin defect. The expanders are gradually filled until enough excess skin is formed. Re-expansion can be repeated, if multiple re-excisions are considered necessary for favourable cosmetic outcome.¹² Repeated added loads applied by the TRS preoperatively over 1 to 2 weeks, allowed for skin elongation using mechanical creep. The TRS thus serves as an external, non-invasive tissue expander. It is applied in the clinic by glueing the plates to the skin without the need for anaesthesia. This is in comparison to the need for additional, preliminary surgery, under general anaesthesia, when inserting an internal expander. Furthermore, the TRS avoids possible complications observed in patients treated with the internal expanders over time such as infection, extrusion and cranial bone changes, some of which may develop even in older children.¹³⁻¹⁵ Unlike internal subcutaneous expanders, recruitment of skin through mechanical creep with the aid of the TRS is achieved mostly by tangential stretching, without exerting pressure on the skull. This allows initiating the procedure at an early age even before the maturation of the cranial bones.¹⁶ Once the preliminary expansion of the skin is achieved, the patient is taken to surgery. Depending on the size of the lesion and anatomical location, part of the lesion or the lesion in its entirety

Patient's perspective

A mother's perspective: A visible disfiguring congenital deformity of a baby is hard to cope with. It came as a shocking surprise following the agonising pain at a moment of birth of a new child. His two young sisters were waiting at home to welcome their new brother. Because of the deformity, one of the sisters would hesitate to get close, touch or play with her new brother. There were questions, why? Would it remain like this? and many more which were hard to answer and understand at their age. And there were the awkward, pitiful looks and questions of neighbours and strangers. It was a complex situation trying to hide the child, trying to protect him and his young sisters. Getting an early solution for treating this deformity was my desire, important, mainly for the baby, to avoid stigmata at an early life, to be able to join the kindergarten with no obvious deformity. Having the reconstructive procedures at a very early age left him with no recollections of that agonising period and allowed him to grow through a relatively normal childhood, even if still, having to answer questions about the mild scar on his forehead. We were blessed for not needing to have the more complex balloon reconstructive processes at an older age.

Learning points

- ▶ Giant congenital facial melanocytic nevi expose young children to significant disfigurement, social pressure, impaired body image, stigmata, and traumatic reconstructive experience and their close family to the emotional and social burden.
- ▶ Though the potential for malignant transformation is small, it is real.
- ▶ Use of tension relief system as external skin expanders allows for forehead skin stretching at an early age by a relatively simple procedure, without causing cranial depression or deformity, and without submitting the child to many of the complications associated with internal subcutaneous expanders.
- ▶ Excision of the nevus at an early age avoids untoward psychological effects of the stigmata at childhood and traumatic reconstructive procedure, allowing for normal childhood development.
- ▶ Use of the TopClosure as an external tissue expander may be considered as the primary reconstructive procedure in the very young children undergoing excision of giant congenital melanocytic nevi.

is resected. Relying on simple excisions of the lesion down to the galea without undermining the skin, limits untoward effects such as surgical bleeding, fluid accumulation in the wound, infection and bruising in the very young patients (figure 1D). During surgery, if indicated, stress relaxation is employed to further elongate the skin. The TRS system allows securing wound closure to avoid late dehiscence by alleviating tension on the sutures by adding mild tension to the plates by a pull on the straps. The TRS can be applied in various vectors, allowing more skin to be recruited for a total coverage of the surgical defect. Matching quality skin graft for unique areas, like the eyelids, was simultaneously applied. Six relatively simple surgical excisions

were required to complete the reconstructive procedures before the age of 2 with the patient having no recollection of the reconstructive procedure.

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Competing interests MT is one of the developers of the TopClosure Tension-Relief System. He is also the chairman of IVT Medical Ltd., manufacturers of the TopClosure Tension-Relief System.

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ORCID iD

Itamar Ashkenazi <http://orcid.org/0000-0002-6305-4159>

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