



Flap Advancement Technique for Scalp Hair Preservation in Massive Cutis Verticis Gyrata

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Abstract

Cutis verticis gyrata (CVG) is a rare skin condition characterized by ridges and furrows resembling the brain. CVG falls under three categories: primary essential, primary nonessential, and secondary. This case report focuses on primary essential CVG, where approximately a fourth of the scalp and a significant portion of the forehead and eyelid were involved.

Flap advancement after skin expansion was performed to rectify the disorder. This technique adequately covers the residual defect postexcision and preserves hair growth in affected regions. It is a successful skin expansion technique to cover the exposed scalp, preserve hair growth, and achieve excellent cosmetic results. Our approach demonstrates a promising solution for severe cosmetic disfigurement in primary essential CVG, positively impacting both the physical appearance and psychosocial well-being of the patient.

Keywords

- cutis verticis gyrata
- tissue expansion
- hair transplant

Introduction

Cutis verticis gyrata (CVG) is a rare skin condition characterized by ridges and furrows resembling the brain.¹ It usually occurs in the scalp region, but the presence of the condition in various other sites like the neck, back, buttocks, and scrotum has also been reported.² Initially classified as primary (idiopathic) or secondary CVG by Polan and Butterworth in 1953, CVG now falls under three categories: primary essential, primary nonessential, and secondary.^{3,4} Primary essential is distinguished from primary nonessential by the absence of neuropsychiatric pathology such as mental retardation, cerebral palsy, epilepsy, seizures, or ophthalmologic abnormalities.⁴ Secondary CVG differs from primary as it always stems from an underlying condition. A common example of secondary CVG is cerebriform intradermal nevus (CIN).⁵

Although benign, primary CVG is often brought to medical attention for cosmetic causes as it affects the patient's social life. Management requires surgical excision of the overlapping skin folds to provide a flat and smooth cosmetic appearance. Surgical modalities range from simple excisions to tissue expansion and skin grafts for patients with more extensive scalp involvement.^{3,6} The purpose of this case report is to present a case of giant primary essential CVG in a 35-year-old man that was managed successfully with surgical excision after scalp expansion.

Case Report

A 35-year-old male presented to the plastic surgery outdoor department with a large fleshy mass encompassing the right parietal side of his scalp

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He reported the onset of skin/disfigurement at the age of 24, initially noticing thickened scalp skin over the subsequent 5 to 7 years, a gradual increase in tissue mass occurred, accompanied by increased hair fall in the affected areas. The mass itself did not cause him any physical discomfort; pain, or itching. His chief concern was cosmetic disfigurement that was negatively affecting his social life. There were no associated complaints of pruritus, pain, or neurological deficits. He did not use anabolic steroids, only topical application of fusidic acid and hydrocortisone. A biopsy had already been performed and subjected to histopathological evaluation, yielding negative results for signs of malignancy. Notably, there was no familial history of this condition, and the patient had no history of consanguineous marriage.

Physical examination revealed a 35 × 26 cm exophytic, hairless, indurated (dark brown colored) tumor with thick folds and grooves in the involved skin across the right parietal scalp extending posteriorly up to the occiput, anteriorly involving the right frontal scalp, and dipping down onto the right eyelid. Roughly 40% of the scalp was involved and lateralized toward the right side in a somewhat band-like fashion. A detailed examination revealed no focal neurological deficits, and an Mini-Mental State Examination proved adequate cognitive abilities. Lymph node examination of the head and neck region produced negative results.

Computed tomography scan of the cranium revealed no bony involvement and the tumor was entirely extracranial. Histopathological evaluation confirmed the diagnosis of CVG. Preoperative baseline tests and lipid profile and thyroid function tests were normal.

Surgical Intervention

A multiphase surgery was planned out.

During *phase 1* of the procedure, we excised the periorbital and forehead lesions. For the forehead defect, a sheet skin graft was obtained from the lateral thigh region and successfully transplanted. Additionally, a full-thickness skin graft from just above the groin area was used for the eyebrow region. Medial to the eye, several nodular lesions were excised and primarily closed, while the upper eyelid underwent successful resurfacing.

During *phase 2*, we opted for expanders placement under the scalp (subgaleal) on both sides of the cerebriform lesion. To achieve this, we inserted two saline expanders posterolaterally about 5 cm distal to the lesion after the initial skin incision and blunt dissection, each equipped with external ports. Both ports were suspended posteriorly and stitched into place.

The right-sided expander had a rectangular shape, measuring 4 cm at the base, 11 cm in length, and 5 cm in height, with a volume capacity of 280 mL. During the process, we expanded it up to 400 mL. On the other hand, the left-sided expander, also rectangular, measured 15 cm in length, 8 cm in width, and 5 cm in height, with a volume capacity of 640 mL. We filled it up to 700 mL.

Initially, 40 and 70 mL of saline were infused in the right and left expanders, respectively. To ensure a controlled and gradual expansion, we followed an alternating filling schedule with saline, performing the expansion process on alternate days in increments of 5 to 10 mL (chronic expansion). For added convenience and continuity, we provided thorough training to the patient's attendant, who had prior experience in the paramedic field, allowing them to carry out saline filling at home.

After 3 months, we managed to achieve expansion slightly beyond the original capacity of the expander.

Phase 3 of the surgery took place 2 months later. Under general anesthesia, the flaps were released with incisions along the medial borders of both implants. Both implants were removed intact. Excision of the remaining tumor was carried out, and advancement flaps from both sides were closed via primary closure with the skin staple gun. Excised tissue was sent for histopathological evaluation.

In *phase 4*, an eyebrow (hair) transplant was performed at a later date with occipital hair as the donor for the brow.

Follow-Up

Two 2-week follow-ups revealed routine healing of the expanded scalp flaps.

One-year follow-up showed excellent hair growth that significantly reduced scar visibility (→ Fig. 1).

Discussion

CVG, also known by the names: paquidermia verticis gyrata, cutis verticis plicata, and "bulldog" scalp syndrome, is a rare cutaneous disorder characterized by convoluted folds and deep furrows of the scalp that mimic cerebral sulci and gyri.⁷ CVG, despite its malignant appearance, is fundamentally a benign condition provided it does not develop secondary to an underlying disorder like CIN.⁵ The patient's main concern is cosmetic disfigurement, which affects their social life and can lead to social isolation.

Treatment/management of CVG mainly depends on its etiology: Secondary CVG usually regresses after treating the underlying condition (although sometimes surgical interventions are required), whereas primary CVG is mostly managed surgically.⁷ Surgical methods vary based on lesion size and patient preferences. They include excision and reconstruction with local or free flaps, skin grafts, or scalp expansion.⁸ Excision and reconstruction via primary closure are ideal for smaller lesions where the defect is not large enough to mandate an allograft placement. Large lesions require bridging tissue that may be a free flap or a skin graft. Free flaps can be harvested from an array of anatomical sites such as serratus anterior, rectus abdominis, omental, and radial forearm. However, the major drawback of such an approach as stated by Dong et al.⁸ is the formation of an unaesthetic hairless region in the surgical area in conjunction with scar formation at the donor site, resulting in an unsatisfactory cosmetic appearance. The free flap also has the disadvantage of requiring microvascular surgery to



Fig. 1 First row—Immediate preoperative before phase 3 of surgery. Second row—Postoperative after phase 3 of surgery, 2 weeks later. Third row—1 year follow-up.

establish adequate blood supply, a scarce resource in most healthcare setups.

The skin expansion technique yields the best results in terms of aesthetics and efficiency. Adjacent scalp tissue is expanded to become advancement flaps, which overcome

limitations of other methods and make postoperative management easier. This technique can eliminate the need for more hair transplant procedures for secondary alopecia. It can also help prevent mental health issues associated with alopecia, such as depression and anxiety.⁹

Conclusion

Skin expansion technique may be used to tackle giant CVG lesions for the best cosmetic and aesthetic results especially if scalp hair regrowth is one of the major concerns of the patient.

Informed Consent

Informed consent was obtained from the patient described in this report.

Limitation

We could not preserve the preoperative pictures before phase 1 (forehead and eyelid reconstruction/resurfacing), regrettably.

Conflict of Interest

None declared.

Acknowledgment

We thank the patient for providing consent for the publication of this case.

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