Case report

Surgical Correction of Webbed Neck using Modified Z-Plasty Technique: A Case Report

Abstract: Webbed neck, also known as pterygium colli, is a rare anomaly with limited documentation in the medical literature. Often associated with Turner syndrome, this condition presents challenges in complete correction due to its severity. In this article, we present a surgical correction approach for a severe case of webbed neck in a 19-year-old individual. The procedure involved a modified Z-plasty technique, resulting in a satisfactory outcome. Our technique addresses both the webbed appearance and low hairline, significantly improving the patient's neck contour.
Keywords: webbed neck, Turner syndrome, surgical technique, pterygium colli

1. Introduction:

Webbed neck, or pterygium colli, is an infrequently reported anomaly in medical literature. The term was first introduced by Kobylinski in 1883 [1] and later coined as pterygium colli by Funke in 1902 [2]. The association of pterygium colli with clinical syndromes, such as Ulrrich-Turner syndrome, was established by Turner in 1938 [3]. While similar neck webbing occurs in syndromes like Escobar's and Klippel–Feil, the exact etiology and development of pterygium colli remain debated. Although initially considered muscular, fibrotic bands in the fascia colli superficialis have been identified [4]. Our case report describes the surgical correction of severe webbed neck in a 19-year-old individual using a modified Z-plasty technique.

2. Case Presentation:

Our patient, a 19-year-old male, presented with congenital severe webbed neck and protruding ears. The webbing restricted neck rotation and clothing choices isolated without pectus excavatum, nipple divergence, or other anomalies.

The karyotype could not be performed due to unavailability at the hospital and the patient's lack of means. The neck malformation was characterized by a thick fibrous band limiting rotational head movements and, consequently, the ability to wear certain clothing. Surgical correction aimed to address the webbed appearance and low-hairline concern (Figure 1).

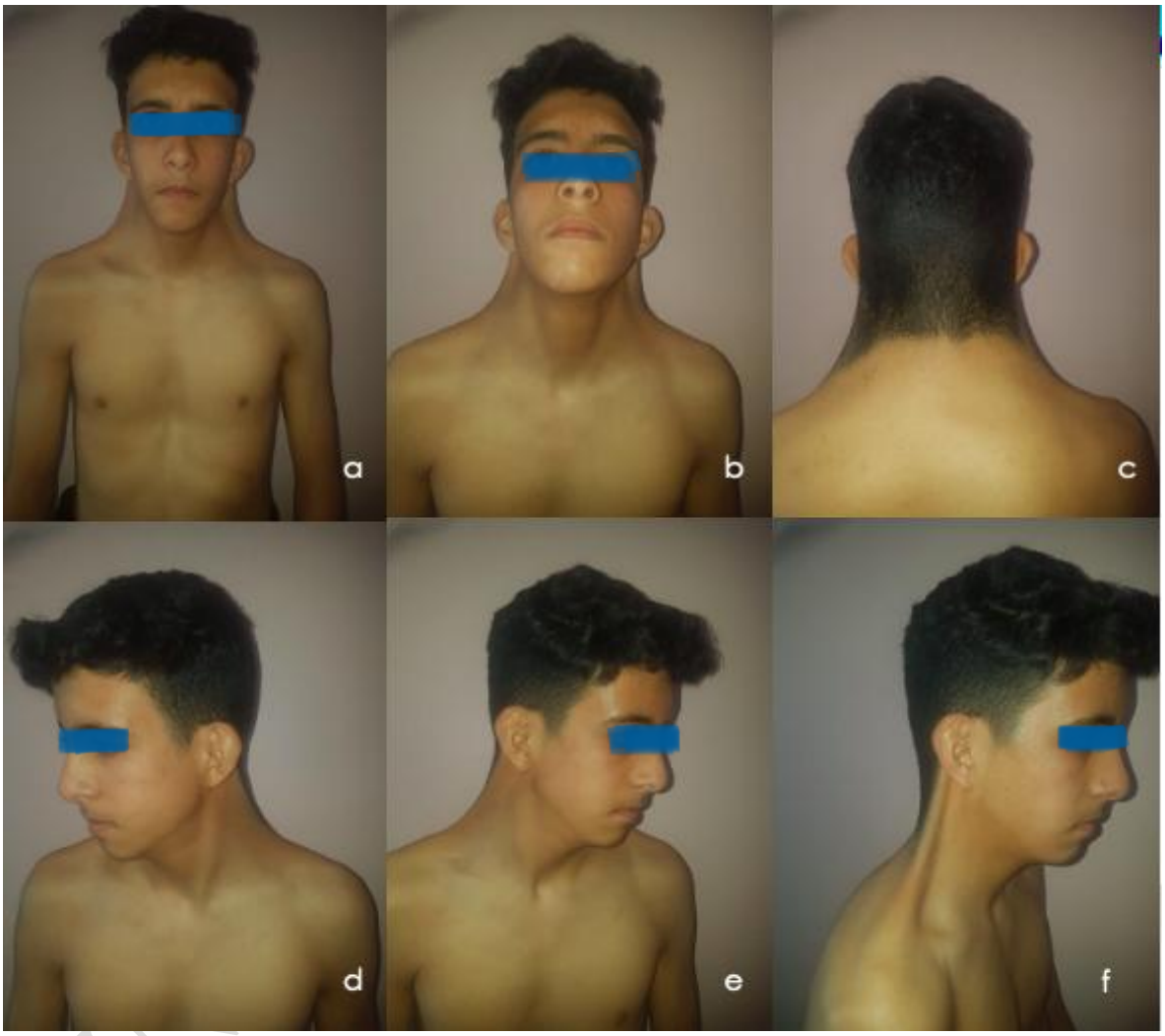

Figure 1: 19-year-old patient with webbed neck deformity and protruding ears, preoperative views:
a: Front view photo
b: Front view with neck extension
c: Back view
d, e, f: lateral views showing thick band limiting rotational head movements

3. The surgical procedure:

We decided to correct the malformation by performing a large Z-plasty (flaps A and B); just like in the preoperative drawing (Figure 2), our incision is hidden behind the retro-auricular groove, and the vertical part of our incision is shifted backward along the hairline.

Two large flaps were dissected in subcutaneous planes using an electric scalpel to isolate them and then transpose them. We then carried out a partial removal of excess skin by gently lifting it backward to resolve the problem of excessive skin, which resembled scar contractures.

This approach was taken to ensure that the resulting scars would be less noticeable and positioned along the posterior hairline, with particular attention to flap B, which had a high density of hair. This simultaneous action also addressed the issue of a low hairline.

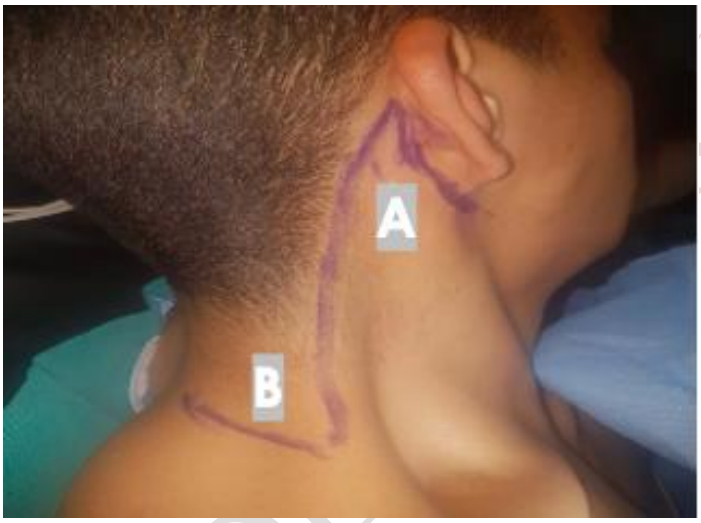

Figure 2: Preoperative drawing performing a large Z-plasty with two flaps A and B.

The platysma played no role in the malformation and was neither thick nor excessive. Scarring was located in the retro-auricular region, on the posterior trichion, and to a lesser extent on the anterior border of the trapezius muscle. The quilting technique using Vicryl 2-0 was deemed relevant to enhance flap adherence and ensure seamless continuity between the neck and shoulders. No drains were used.

The skin was sutured using Monocryl 4-0 without any drainage (Figure 3).

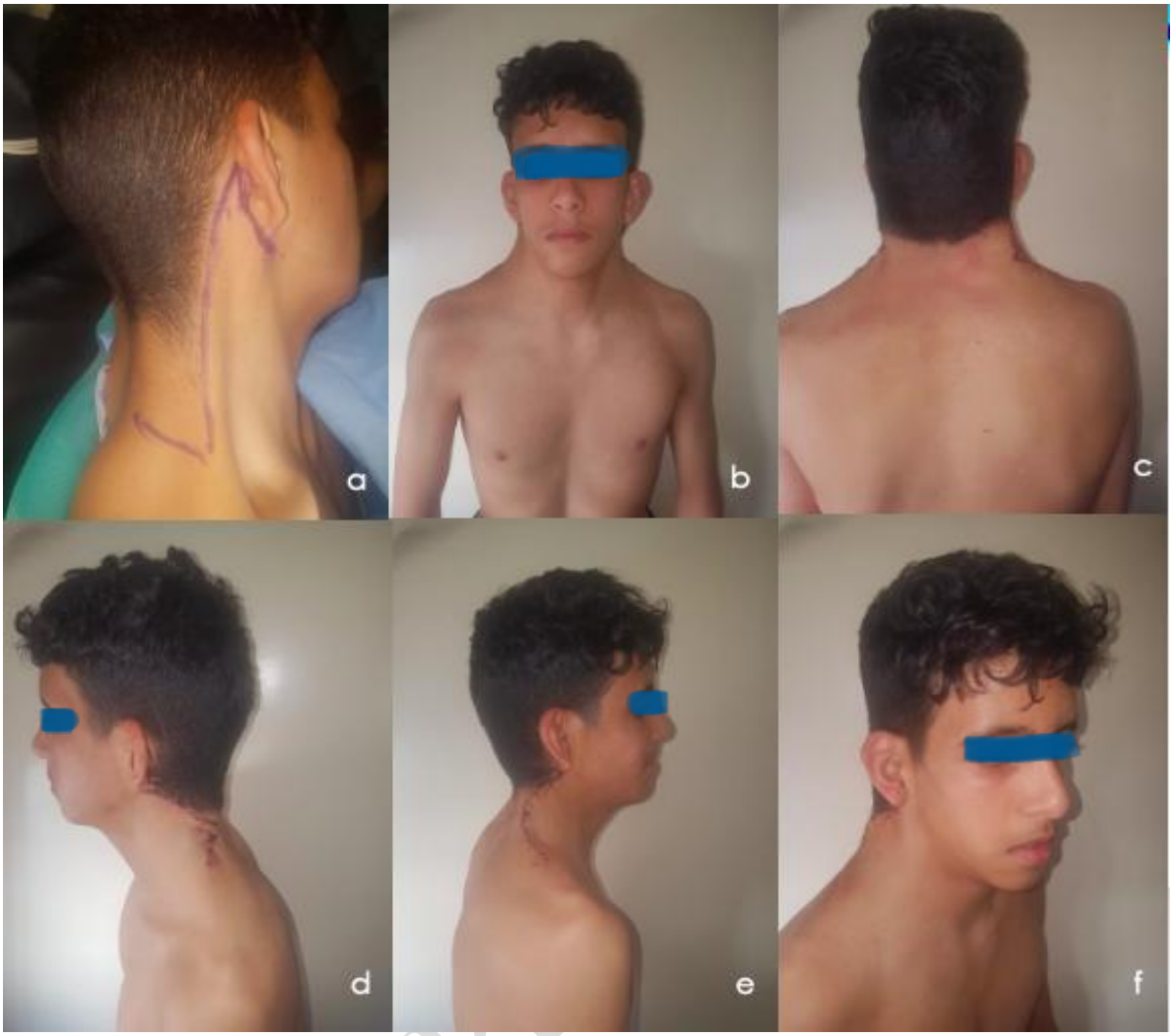

Figure 3: a: Preoperative drawing with Z-plasty
b: Front view photo one-week postoperative showing significant improvement of the neck contour, an upper hair line.
c: Back view
d, e, f: Lateral views

An anatomopathological examination revealed edematous fibroadipose tissue without histological anomalies.
Postoperatively, the patient developed hypertrophic inflammatory scars, silicone sheets were advised for scar management and local anti-inflammatory injections, but limited usage underscores the significance of patient compliance and access to follow-up care.
One-year post-surgery, the patient exhibited improved neck and shoulder shape, free neck movement, and normal hairline with inflammatory scars inflammatory scars that did not bother at all the

patient who no longer wanted to attend the follow-up appointments and chose to send us photos via telephone instead (Figure 4).

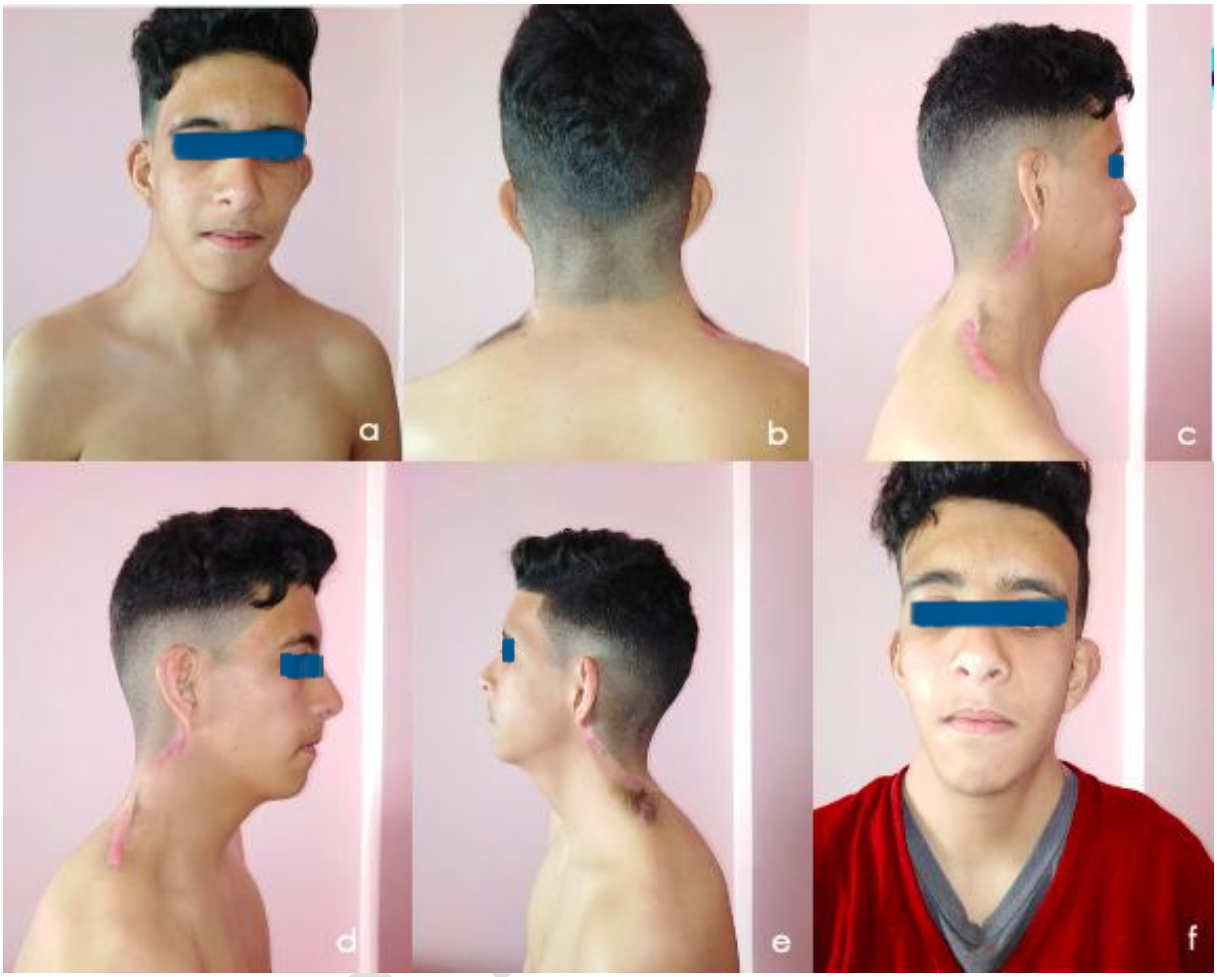

Figure 4: Photos sent by the patient one-year post-surgery, the patient exhibited improved neck and shoulder shape, and normal hairline and some inflammatory scars.
a: Front view photo
b: Back view
c, d, e: Lateral views
f: The patient is able to wear certain clothing

4. Discussion:

The etiology of pterygium colli remains elusive, with several hypotheses attempting to explain its development. The differential growth theory proposes that a discrepancy in growth rates between cervical and acromial regions during embryogenesis leads to the condition. Another theory suggests that embryonic cyst regression results in residual skin changes [5].

While these concepts provide insights into the potential mechanisms, they also underline the complexity of the anomaly.

The surgical correction of pterygium colli, characterized by webbed neck deformity (WND), remains a complex endeavor owing to its rare occurrence and diverse clinical presentations. Over time, our understanding of this condition has evolved, leading to refinements in treatment strategies. The objectives of surgical intervention for WND encompass both aesthetic enhancements and functional improvements. This includes redistributing and excising excess skin to restore a harmonious neck contour and alleviate restrictions in neck mobility. Correcting the low hairline is also pivotal for achieving a normalized appearance [5—7].

Various surgical approaches exist for treating WND [7—13], but a consensus on the most effective method is yet to be established [14]. Often, a single-stage radical excision and reconstruction technique is employed, resulting in prominent scarring and some degree of persistent deformity [15]. Traditional techniques frequently involve Z-plasty addressing directly de band, multiple Z-plasties [16,17], leaving visible scars. While newer approaches like the 'M to T rearrangement [18], or 'Posterior Cervical Lift' effectively correct hairline displacement, they may still result in noticeable scar tissue [19].

Our modified Z-plasty technique, involving a single Z-plasty, offers distinct advantages by addressing both the low hairline displacement and also minimizing visible scarring by following less conspicuous lines, including the retroauricular groove and the posterior hairline the removal of the excess skin is obtained by gently lifting it backward to before removal (Figure 5).

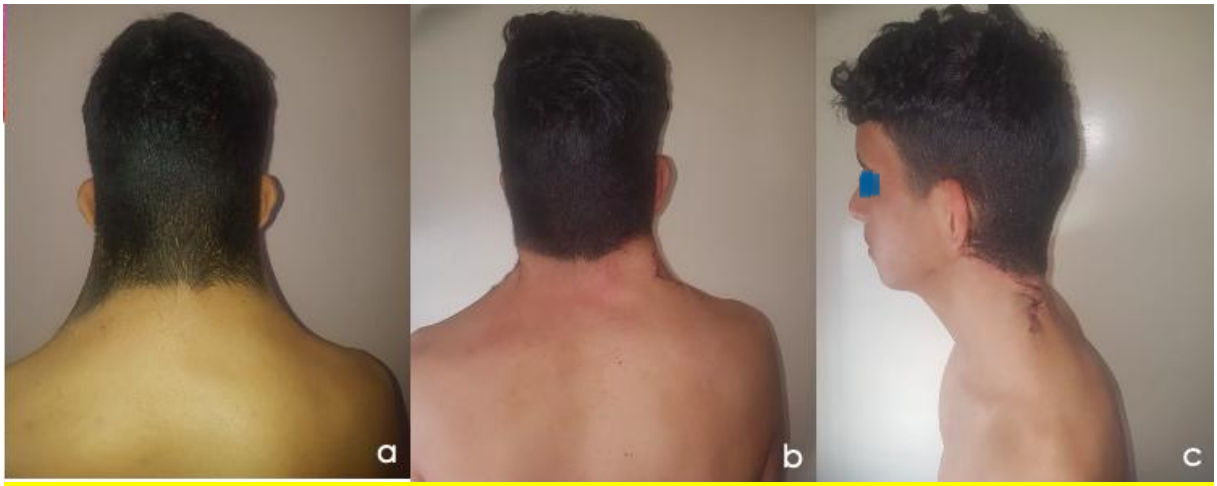

Figure 5: a,b Comparative back view before and after surgery showing that we addressed the low hairline issue.
c: Lateral view showing the scars positioned along the posterior hairline.

The outcomes from this procedure demonstrate improved results with reduced visible scarring and superior cosmesis compared to traditional methods.
Our patient's postoperative outcome reflects the achievement of multiple goals, including enhanced self-esteem, increased clothing options, and unrestricted neck mobility. In the realm of surgical techniques, the modified Z-plasty procedure presents notable advantages for severe WND cases.

The postoperative development of hypertrophic inflammatory scars in our case highlights the potential for complications in surgical correction, Van Kouwenberg et al, described recently a new approach using a staged endoscopic-assisted procedure to adress Scar Burden but requires mastery of endoscopy and several operating times [20].

. While silicone sheeting was advised for scar management, its limited usage underscores the significance of patient compliance and access to follow-up care. Further research into scar prevention and management could contribute to optimizing the overall patient experience and outcome.

5. conclusion:

The surgical correction of webbed neck (pterygium colli) remains a specialized area within plastic surgery. Our case report offers valuable insights into the successful use of a modified Z-plasty technique for severe cases.

This approach not only addresses the multifaceted aspects of the condition but also holds the potential to become a recommended method in the management of pterygium colli.

Further studies and collaborative efforts are warranted to refine surgical strategies, minimize complications, and enhance the quality of life for individuals with this rare congenital anomaly.

Ethical Approval:

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

Consent

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

References:

[1] Kobylinski D. Ueber eine flughautähnliche Ausbreitung am Halse. Zeitschrift für Naturgeschichte und Urgeschichte des Menschen 1883;14:343.

[2] Funke O. Pterygium colli. Dtsch Z Chir 1902;63:162.

[3] Tuner HH. A syndrome of infantilism, congenital webbed neck, and cubitus valgus. Endocrinology 1938;23:566.

[4] Bruin MD. Pterygium colli congenitum (congenital webbing). Am J .
Dis Child 1928;36:333.

[5] Miller LB. Treatment of web neck in Turner's syndrome with tissue expansion. Ann Plast Surg 1990;24:447—50.

[6] Sherin Jr JC, DeFranzo AJ. Butterfly correction of webbed neck deformity in Turner's syndrome. Plast Reconstr Surg 1980;66:129—33.
[7] Agris J, Dingman RO, Varon J. Correction of webbed neck defects. Ann Plast Surg 1983;11:299—307.
[8] Gargan, Thomas J. Web neck deformity in Turner syndrome. Plast Reconstr Surg 1997;99:871—4.
[9] Rossillon D, De Mey A, Lejour M. Pterygium colli: surgical treatment. Br J Plast Surg 1989;42(2):178—83.
[10] Thompson SJ, Tanner NSB, Mercer DM. Web neck deformity: anatomic considerations and options in surgical management. Br J Plast Surg 1990;43:94—100.
[11] LeandrisM,RicbourgB.SurgicaltreatmentofpterygiumcolliA case report and review of the literature. Ann Chir Plast Esthet 1997;42(6):615—22.
[12] Qian JG, Wang XJ. Noonan syndrome and correction of the webbed neck. Principio del formulariFinal del formular. Ann Plast Surg 2007;60(3):316—9.
[13] Khalifa MM, Graham G. New dominant syndrome of pterygium colli, mental retardation, and digital anomalies. Am J Med Genet 1994;52(1):55—7.
[14] Turki IM. Surgical techniques for the webbed neck: a narrative review with a comparative study and surgical decision-making algorithm for an optimal aesthetic result.. Oral Maxillofac Surg. 2023 Jun 20.
[15] Mehri Turki I. Surgical correction of the webbed neck: an alternative lateral approach. GMS Interdiscip Plast Reconstr Surg DGPW. 2017;6:0.
[16] Mohd Said MT, Halim AS, Mat Zain MA, Koh KL. Modified Five-Flap Z-plasty for Surgical Correction of Webbed Neck Deformity in Turner Syndrome. Cureus. 2023 May 21;15(5):e39312.
[17] Jungbauer WN Jr, Rich MD, Barta RJ, Lacey MS. Surgical Techniques for the Repair of Webbed Neck: A Scoping Review. .J Craniofac Surg. 2022 Nov-Dec 01;33(8):2644-2649.
[18] Murthy AS, McGraw M. M to T rearrangement: an approach to correct webbed neck deformity. Case Rep Med. 2014;2014:682806.

[19] C.M.Z. Posso *, G.A. Wolff, L.D. Suarez. Pterygium colli : reprise d'une correction chirurgicale d'un cas sévère Pterigium colli: Secondary surgical correction of one severe case . Annales de chirurgie plastique esthétique (2012) 57, 299—303.
[20] Van Kouwenberg E, Chattha AS, Adetayo OA. Improving Functional and Aesthetic Outcomes in Syndromic Patients With Webbed Neck Deformity: Utilizing a Staged Endoscopic-Assisted Approach to Improve the Posterior Hairline and Decrease Scar Burden. J Craniofac Surg. 2017 Jun;28(4):995-997.