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RESEARCH ARTICLE

CERVICAL SCAR CONTRACTURES: EXPERIENCE OF THE PLASTIC SURGERY DEPARTMENT IN MARRAKECH

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Abstract

Deep cervical burns can lead to disabling sequelae, especially in cases of delayed, incorrect, or inadequate initial burn management. The aim of this study is to report the various epidemiological aspects of cervical contractures, analyze therapeutic modalities, and emphasize the importance of prevention. Our work is a retrospective study spanning a period of 10 years from July 2013 to July 2023, which includes 107 cases of cervical contractures followed at the Plastic and Reconstructive Surgery Department and Burn Unit of the Mohammed VI University Hospital Center in Marrakech. The average age of our patients is 20 years, ranging from 1 to 55 years. 68% of the studied population is female, with a sex ratio of 2.14. They mostly come from a low socioeconomic background. The most frequently found circumstances of the initial burn were domestic accidents, accounting for 80% of all accidents. The etiology of the initial burn is thermal in all patients in our series, 100%. In our study, the majority of cases were initially managed in non-specialized health centers or even at home through traditional practices. Initial treatment involved conventional treatment in 45.5% of cases, early excision with grafting in 22.7% of cases, and physiotherapy (compression therapy, massage) in 22.7% of cases. The topographic distribution of sequelae showed a predominance of anterior neck involvement in 96% of cases. Facial burn sequelae are most frequently associated (70%) with cervical contractures, followed by trunk sequelae (50%). The majority of patients (80.5%) present with deformation of the cervico-mental angle, as well as limitation of cervical extension. Severe cervical contractures (according to Achauer's classification) are the most frequent, representing 44.6% of cases. Surgical treatment of these sequelae involves various methods, including skin grafts used in 50.6% of cases, local flaps used in 38.4% of cases, flaps used in 5.5% of cases, and skin expansion used in 5.5% of cases. Functional and aesthetic improvement is achieved in 85.9% of cases, while surgical revision was necessary in 5 patients. Cervical burn sequelae pose a major therapeutic challenge, despite the diversity of surgical procedures, hence the importance of prevention.

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Introduction:-

The neck is the portion of the body that supports the head and enables its mobility. The head can flex, tilt, and rotate. This area deserves to be distinguished due to its anatomical, functional, aesthetic, and psychological importance. Its skin, which is very distinctive, exhibits significant plastic characteristics concerning thickness, flexibility, mobility, color, texture, and elasticity, all of which must be taken into account when selecting the donor site for reconstructing a burned neck. Cervical burns can lead to disabling sequelae, resulting in aesthetic and functional impairments[1].The timeliness and quality of initial management are crucial factors in determining the subsequent outcomes. Typically performed at the stage of scar maturation and skin stabilization, surgical repair involves, as indicated, various reconstructive surgery techniques (skin grafts, local flaps, pedicled or free flaps, and skin expansion). However, in children, surgical intervention must be early due to its impact on growth, especially in the mandibular bone aera [2].Only a collective therapeutic strategy can guarantee a quality outcome. The objective of this work is to identify, through a retrospective study and literature review, the epidemiological and clinical characteristics, as well as the current therapeutic means and indications proposed based on the severity of the contracture. To achieve this goal, we conducted a retrospective study spanning 10 years, which allowed us to gather 107 cases managed at the Plastic Surgery and Burn Unit of the Mohammed VI University Hospital Center in Marrakech.

Patients and Methods:-

To describe the epidemiological, clinical, and therapeutic profile of cervical burns in the sequel phase within the Department of Plastic, Reconstructive, Aesthetic, and Burn Surgery at the Mohammed VI University Hospital Center in Marrakech, we conducted a retrospective study over 10 years, from July 2013 to July 2023. During this period, we collected data on 107 patients with at least one sequela of neck burns admitted to our department for management. Patients with cervical contractures occurring under circumstances other than burns or presenting with extrinsic contractures (on the face and trunk) were not included. The collection of epidemiological, clinical, therapeutic, and prognostic data was conducted using patients' medical records, photographic documentation of the burns available in the department's archives, as well as through telephone contact. These data were analyzed using a predefined form. For patients who came for treatment of their sequelae and did not receive burn treatment during the initial phase in our department, only information gathered during interviews with the patients and documented in their medical records was considered. The data were entered and analyzed using SPSS 13.0 software for Windows, while maintaining patient anonymity and confidentiality during data collection.

Results:-

Epidemiological Profile:

During the study period, 1430 cases of burn sequelae were recorded at the Plastic, Reconstructive, and Burn Surgery Department, with 107 cases presenting cervical contractures, representing a frequency of 7.5%. The average age of patients seeking treatment for sequelae was 20 years, ranging from 1 to 55 years old. The age group of 1 to 10 years old was the most affected, accounting for 32% of cases. Among these, 30 were female, constituting 68.2% of the total, and 14 were male, representing 31.8%, with a sex ratio of 2.14. Nearly 60% of patients in our series lived in rural areas under average to disadvantaged conditions.

Burn Mechanism:

The burns occurred 5 to 10 years ago in over a third (36%) of patients in our series. Regarding the causal agent, all burns in our series were of thermal origin, with 56.8% being scald burns and 43.2% flame burns. The distribution of the causal agent according to age shows that scald burns predominate in the age group of 1 to 20 years. For the age groups of 20 to 30 years and over 30 years, flame burns are more frequently implicated.

Clinical Profile:

Regarding the depth of the initial burn, 68.2% of patients presented with deep second-degree burns, while 31.8% of patients initially presented with severe third-degree burns. Concerning the location of the sequelae, four cases of posterior contractures were observed in our series (3.7%). Anterolaterally (according to the VANDENBUSSCHE classification), 24 patients had contractures affecting a single meridian of the neck, accounting for 22.4% of our series. 31 patients had contractures affecting two meridians, representing 28.9% of our series. 40 patients had contractures affecting all three meridians of the neck, accounting for 37.3% of our series. 4 patients presented with a folded neck appearance, representing 3.7%, and four cases of mento-sternal symphysis. Out of the 107 patients in our series, only 12 patients (11.4%) had isolated neck involvement.The most frequently associated burn sequelae

locations with cervical contractures are those of the face (71 cases, 65.9%) and trunk (53 patients, 50%). The majority of patients, 88 cases in our series, exhibit deformation of the ACM (angle cervico-mentonnier), as well as limitation of cervical extension, while 18.2% (n=19) of patients have lateral contractures, resulting in a slight limitation of head rotation and lateral flexion movements. The quality of scar tissue and ACM deformation affect facial structures, observed in 49 patients, or 45.5%, with lower lip eversion (22.7%), cheek attraction noted in 9.1% of patients, lower eyelid ectropion marked in 4.5%, and earlobe attraction in 4.5%. According to the ACHAUER classification, cervical contractures in our series are distributed as minor contractures in 17 patients (15.9%), moderate contractures in 39 patients (36.4%), severe contractures in 46 patients (43.2%), and major contractures in 5 patients (4.5%).

Surgical Management:
Surgical procedures performed on our patients can be classified into four main types: Skin grafts were performed on 51 patients, accounting for 47.6%, distributed as full-thickness skin grafts in 34.1% of cases and split-thickness skin grafts in 13.5% of cases. Local flaps were performed on 48 patients, representing 44.8% of cases. These included Z-plasty in 26 patients (24.3%), which allows elongation of the linear contractile scar; trident flap in 18 patients (16.8%), and IC (interpolation flap) in 4 patients (3.7%). Flaps were used in 4 patients (3.7% of patients), including a retroauricular flap, posterior fasciocutaneous flap, supraclavicular flap, and trapezius musculocutaneous flap. Skin expansion, a method aimed at obtaining significant skin gain by expanding certain donor sites with acceptable scarring, was performed on 4 patients (3.7%).

Postoperative Care:
All operated patients received medication including analgesics and antibiotic prophylaxis after surgery for a duration of eight days. The use of a neck brace was systematic for all operated patients. Patients who underwent skin grafts were prescribed topical scar treatments for massage, in addition to total sunblock and sun avoidance. Compression garments were also prescribed after graft healing (with or without silicone gel sheets) to limit the occurrence of hypertrophic scars. Antihistamines were indicated for patients experiencing itching (topical or systemic depending on the intensity of the itching). Physical therapy and rehabilitation were integral to the surgical management of these neck burn sequelae.

Outcome:
For all patients in our series, short-term, medium-term, and long-term follow-up was maintained up to eighteen months to assess the final result. Functional and aesthetic improvement was achieved in 95 patients, accounting for 88.6%, while surgical revision was necessary in 12 patients. Table I summarizes the therapeutic results obtained based on the repair procedure used. It shows that local flaps yield the best results, with 75% showing good outcomes. Among patients treated with skin grafts, we observed 65% good outcomes and 25% fair outcomes, while graft contracture occurred in 10% (treated with split-thickness skin grafts), necessitating further corrective surgery.

Results in Percentage: (%)				
Techniques	Number of case	Success	Fair	Failure
Local Flaps	48	75%	25%	
Skin Grafts	51	65%	25%	10%
Flaps	4	50%	50%	
Skin Expansion	4	50%	50%	

Surgical outcomes are perceived differently by patients and vary based on gender. We found that our patients were: Satisfied with the surgical outcome in 81.8% of cases. Dissatisfied in 18% of cases; this proportion primarily involved 95% of young females seeking more aesthetic improvement.

Discussion:-

Untreated cervical burns are frequently encountered in developing countries. The healing process of these burns often leads to contractions that can affect not only the entire cervical collar but also adjacent structures such as the cheeks and mandible. The low socioeconomic status of the family, as well as the mother's level of education, are the main demographic factors associated with a high risk of burns and consequently their sequelae. The frequency of post-burn cervical contractures in the literature varies between 5% and 39.9%. An observational prospective study

conducted by Saaiq [1], over a period of approximately four years, at the Department of Plastic Surgery and Burn Care, Islamabad, the highest frequency is reported, with 39.9% of cases (out of 213 cases of burn sequelae) of cervical contractures. The frequency recorded in our series (7.5% out of 1430 cases of burn sequelae collected at the Plastic Surgery Department in Marrakech over 10 years) is similar to that reported by Kadio et al. [2](7% out of 72 cases of burn sequelae) and that of Nath et al. [4] (6.6% out of 562 cases of burn sequelae). The average age in our series is 20 years. This average corresponds with that of the Bhattacharya et al. series [3] and that of ELAmrani et al. [4], who reported averages of 21.2 and 22, respectively, while it is significantly higher in the Zhang [5] and Rafik [6] series with averages of 25 years. Our study concludes that females are more predominant. Indeed, 68.2% of the studied patients are female. This is consistent with the results found in most series. According to Gangemi et al. [7], the risk of pathological scarring after burns is higher in women than in men. Hormonal factors may be involved since studies have shown that estrogen plays a role in regulating certain growth factors released during the healing process, particularly TGF-β1 [8].The sequelae preferentially affect the anterior and lateral regions [9], with postero-cervical involvement being rare [9, 10, 11]. This may be due to the circumstances of the burn (accidental spillage of a hot liquid, flashback phenomenon, or explosion [12]), making anterior neck involvement more common. Additionally, the anterior cervical region combines all factors favoring the development of contractures [13, 14, 15]: concavity, thinness of the skin, high mobility, difficulty in immobilization, and thinness of the hypodermis directly related to the platysma. Posterior contractures are rarely reported in the literature: the Mimoun series [16] reported only one case of posterior contracture out of 63 cases (1.5%), while Onah [10] reported four cases (9.76%) in a series of 41 cases.The study by Elamrani et al. [4] reported no cases of posterior cervical contractures. In our series, four cases of posterior cervical contractures were reported (4.5%). Isolated cervical burns are rare and often superficial. However, deep burns in this region typically occur in the context of extensive injuries, which may involve burns to the face or chest [17]. This is the case in our series, where burn sequelae are confined to the cervical region in only 11.4% of cases, while they are associated with other locations in 88.6% of cases, predominantly involving the facial (65.9%) and thoracic (50%) areas. This is also observed in the series by Nath et al. [18], where isolated neck contractures were found in only 8% of cases (a series of 37 cases), while involvement of the face and chest was recorded in 84% and 62% of cases, respectively.In the literature, several classifications have been proposed, ranging from Texier's classification (1963), which categorized cervical retractions into three groups based on the extent of burns [16], to Onah's classification [10], which considers posterior cervical contractures. However, two classifications remain the most commonly used by authors: the Lille classification proposed by Vandenbussche in 1978 [19] and the Achauer classification from 1991 [20]. In addition to limiting neck movements, cervical contractures can have other consequences: these may include varying degrees of lower lip eversion leading to drooling [21,22], cheek attraction, or lower eyelid ectropion [21,23].These lesions were found in 45.5% of patients in our series, with lower lip eversion being the most common (22.7% of cases). Articular disorders of the spinal column are mainly seen with significant limitations in neck extension, particularly in sternomenton fusion, leading to vertebral kyphosis [24]. As highlighted by Achauer [20], the treatment of burn sequelae is not an isolated phenomenon that begins after the healing of the burned area, but rather a process that starts from the admission of the burn patient in the acute phase, involving all preventive measures to minimize the severity of these sequelae. Whether through early excision and grafting or through directed healing, with or without subsequent secondary coverage, the key is to achieve burn healing within 3 weeks, as a longer delay is associated with the development of contractile scars [9].Contractile scars are common sequelae of deep burns, and when rehabilitation fails to restore ACM (angle cervico-mentonnier) amplitudes, surgical treatment is indicated [25]. The Z-plasty [26, 27] represents the cornerstone of contracture treatment, being a local transposition flap, the most used technique in our series, employed in 22.7% of cases. The trident flap [28, 29] involves the use of two asymmetric Z-plasties opposed at their apices with a VY-type flap, used in cases where a contractile scar separates mobile, pliable skin from sclerotic, scarred skin. It was performed in 11.4% of patients in our series, yielding satisfactory functional and aesthetic outcomes. In our series, local flaps yielded 75% good results in patients with minor contractures. For moderate contractures, skin expansion can be useful in increasing the healthy skin surface area in the neck. In cases where local flaps cannot be performed, supraclavicular skin (either graft or flap) yields good results in terms of color and texture [30].For severe and major contractures, the provision of healthy skin from a distant site (skin graft or flap) is essential. Some authors [31, 30, 32] advocate for the use of flaps (pedicled or free, preferably expanded) instead of grafts, as grafts are more prone to the risk of secondary retraction and pigmentation disorders. However, according to Mimoun [33], the two aesthetic units of the neck are geometrically different from each other (flat horizontal unit and cylindrical vertical unit) and cannot be repaired by a single skin flap without obliterating the cervico-mental angle. Therefore, the primary treatment for this type of contracture is liberation-grafting (preferably with full-thickness skin graft), following the aesthetic units of the neck [20, 9, 16, 19], combined with cervical immobilization with a neck brace for at least 6 months. The use of distant flaps may be reserved for cases of failure

or difficulty in performing liberation-grafting (lack of graft donor sites) and for patients who are non-compliant with wearing the neck brace (such as children or mentally ill patients).

Conclusion:-

The management of cervical contractures is multidisciplinary, involving surgeons, physiotherapists, intensivists, and psychologists. Although it may not restore the burn victims' lost image entirely, surgical intervention can bring significant improvements that enhance comfort and facilitate social and occupational reintegration.

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