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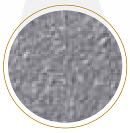

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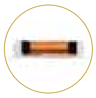

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1. Sforza M, Hammond DC, Botti G et al. Expert Consensus on the Use of a New Bioengineered, Cell-Friendly, Smooth Surface Breast Implant. Aesth Surg. J. 2019 May, 39(S3):S95-S102. doi: 10.1093/asj/sjz054 **2.** ISO-14607:2018 Non-active surgical implants - Mammary implants - Particular requirements. **3.** Atlan M. Lecture presented at: Audition publique ANSM.; March 26, 2019; Paris, France. **4**.Cappellano G, Ploner C, Lobenwein S et al. Immunophenotypic characterization of human T cells after in vitro exposure to different silicone breast implant surfaces. PLoS ONE 2018;13(2):e0192108. **5**. Chacón M, Chacón M, Fassero J. Six-Year Prospective Outcomes of Primary Breast Augmentation with Nano-Surface Implants. Aesthet Surg J. 2018; doi: 10.1093/asj/sjy196. **6.** James G, Boegli L, Hancock J et al. Bacterial Adhesion and Biofilm Formation on Textured Breast Implant Shell Materials. Aesth Plast Surg. 2019 Apr; 43:490–497. **7.** Jones P, Mempin M, Hu H, et al. The functional influence of breast implant outer shell morphology on bacterial attachment and growth. Plast Reconstr Surg. 2018;142(4):837-849. **8** Doloff J. Overcoming host rejection response to improve breast implant biocompatibility. Oral presentation at: 3rd World Symposium on Ergonomic Implants; Sep 2017; Lago di Garda, Italy. **9.** Sforza M, Zaccheddu R, Alleruzzo A et al. Preliminary 3-year evaluation of experience with SilkSurface and VelvetSurface Motiva silicone breast implants: a single-center experience with 5813 consecutive breast augmentation cases. Aesthet Surg J. 2018; 38(Suppl 2):S62-S73. **10.** Huemer GM, Wenny R, Aitzetmüller MM, Duscher D. Motiva Ergonomix Round SilkSurface Silicone Breast Implants: Outcome Analysis of 100 Primary Breast Augmentations over 3 Years and Technical Considerations. Plast Reconstr Surg. 2018; 141(6):831e-842e. **11.** Sim HB. Revisiting Prepectoral Breast Augmentation: Indications and Refinements, Aesthet Surg J. sjy294, https://doi.org/10.1093/asj/sjy294. **12.** Nelson MT, Brattain KA, Williams JM. Does Electronic Identification Enablement for Silicone Gel Implants Impact Patient Safety? J Surg Open Access. 2018;4(1). doi: 10.16966/2470-0991.162.

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Editorial

Dear friends,

Last year has been a significant turning point for the whole world. 'Thanks' to the pandemic we, as a whole, have found ourselves in situations we never thought we'd find ourselves in. I am incredibly proud of the doctors and the nurses in our field as they have shown both an amazing ability to adapt to daily organizational changes, their extreme professionalism and especially an accepting approach to the voluntary care of covid positive patients.

The start of the pandemic was marked by uncertainty and ignorance of the disease´s behaviour. As we all remember recently, we have been exposed to a lack of protective equipment, information about extreme mortality in foreign epicentres, and the very real fear for our friends' and family's safety.

The committee of the Czech Society of Plastic Surgery responded promptly to the call to reduce unnecessary medical care, which not only helped us save the necessary protective equipment for other medical professionals as well as civilians, but also minimized the spread of the virus.

In the following months, thanks to the sharing of information from around the world and the possibility of introducing PCR testing, we were suddenly able to afford to change our approach and expand patient care.

As the situation gradually stabilizes, I still see a decrease in the mutual contact between experts from distant workplaces. At the same time, we all know very well that people cannot be treated at a distance, half of the success of any doctor's work is direct communication with the patient.

The same goes for teaching medicine. Despite the immense efforts of all lecturers to maintain the continuity of pregradual and postgradual education, personal, real life contact with students and colleagues from other workplaces cannot be replaced by electronic communication. However, I must highlight the training of the twenty-four lecturers who, without any doubt, helped enable the smooth running of the weekly precertification course.

Although the majority of professional events took place online, we have postponed our congress twice already, hoping that we will all meet in person.

Wishing you and yours a safe, healthy, and prosperous new year 2021.

Prof. Andrej Sukop, MD, PhD
President
Czech Society of Plastic Surgery CzMA

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Three-Stage Paramedian Forehead Flap Reconstruction of the Nose Using the Combination of Composite Septal Pivot Flap with The Turbinate Flap and L-Septal Cartilaginous Graft – a Case Report

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Summary

Nasal basal cell carcinomas are the most common malignant tumors of the facial skin, which predilectively affect areas exposed to sunlight, including the nasal area. After their radical removal, there is a variable complex defect of the affected area (defect of all 3 layers of the nose) or even a composite defect (it also occupies the adjacent soft tissues around the nose), which are usually used to reconstruct this area. A 73-year-old female patient with recurrent infiltrative basal cell carcinoma of the left nasal ala underwent four re-excisions before histologically verified free margins without the presence of the tumor. The result was a composite defect that occupied the top of the dome of the right nostril, the entire left half of the soft nose, including the base of the wing, part of the upper lip, and a defect of the adjacent face area of 9 × 5 cm. In the first phase, the left cheek and upper lip were reconstructed by advancement French plasty and coverage of the two residual skin defects with full-thickness skin graft. One month later, during the second phase of reconstruction, the flap was re-elevated, shifted and rotated, and a three-stage nasal reconstruction was started using a composite septal pivotal flap and left turbinate flap for inner lining reconstruction, and the nasal skeleton was reconstructed with a cartilaginous L-graft from the 6th rib, septal and conchal cartilages. The skin cover of the nose was reconstructed with the left paramedian forehead flap, which was thinned during the second stage with the simultaneous widening of the bottom of the left nostril by the transposition flap, during the third stage the flap pedicle was removed. In the reconstruction of a complex defect of the nose and its surroundings, it is first necessary to create a stable platform on which the reconstruction of the nose itself will be performed. To achieve an excellent functional and aesthetic result of nose reconstruction, it is appropriate to use a three-stage forehead flap. In this paper, we describe a unique method of nasal reconstruction - a combination of a septal pivotal flap with a turbinate flap to reconstruct the inner lining in conjunction with an L-graft to ensure a stable nasal skeleton and forehead flap to reconstruct the skin cover.

Key words

nasal reconstruction – composite septal pivotal flap – turbinate flap – forehead flap

Introduction

Basal cell carcinoma is the most common malignant skin tumor of the face. Basal cell carcinomas can grow locally infiltratively and destructively, usually without metastasizing. Due to the stochastic effect of sunlight, the predilection site for these tumors is all the sunlit areas, which include the face (forehead, nose, cheeks), both forearms and often the skin of the chest, lower legs and back [1,2].

The prevalence of basal cell carcinoma is increasing; the incidence increases with age, the most at risk group are patients after the 6th decade of life. The growth rate of basal cell carcinoma is individual for each patient. The removal of large tumors in the face results in large, complex defects that affect the eyelids, nose and adjacent areas. Nasal basal cell carcinomas can be treacherous in that they lead to the destruction of soft tissues to varying depths and, in the case of the nose, they can cause complex defects in all layers of the nose and often the loss of the soft nose. Repeated re-ex-

Figure 1. Patient before tumor onset.

Figure 2a. Condition after second re-excision.

Figure 2b. Condition after radical complete resection of the tumor resulting in loss of half of the soft nose to the right in the tip area, complete loss of the left half of the soft nose and soft tissue loss of the upper lip and left cheek of size 9 × 5 cm.

cision is often required to achieve histologically clear margins and to safely begin reconstruction of the nose or other parts of the face [1–4].

The nose has a pyramidal shape, the nasal cartilage and bones lie between the mucous lining and the skin cover. During the reconstruction of the nose, the procedure is carried out in individual layers up to the outer skin cover. The basis of nasal reconstruction is to create a well-vascularized inner lining of the nose, on which the construction of the nasal skeleton can be performed by implantation of a bone and cartilages, and the last step is to cover a large skin defect with a well-vascularized pedicled forehead flap. The advantage is that the forehead flap has the same color and texture as the skin of the nose, but is inadequately thick. Therefore, after the forehead flap has adhered, its re-elevation, thinning and shaping is recommended with an interval of 1 month, and the flap pedicle can be removed in the next month [5–7]. In order for the above to be done, the entire reconstructed nose must be built on a well-vascularized inner lining. Many methods of its reconstruction are described, but the most advantageous methods are those in which the original mucosa of the nasal cavity is used, because it is thin, well vascularized and does not obstruct the airways. A good source is the septal mucosa, which is supplied by the septal branch of the superior labial artery and other multiple arteries, and therefore the septum is used as the most common source of material, although it is of limited size. An alternative source of lining may be the turbinate flap on its ventral pedicle. The following case describes the unique use of a combination of composite septal pivotal flap and turbinate flap, which allows completely replacing the inner lining of one nostril without having to use both forehead flaps or free flap due to the size of the defect.

Description of the case

In a 73-year-old female patient who had her basal cell carcinoma of the left nasal wing removed by excision in 2014, extensive tumor recurrences of approximately 1.5 cm in diameter were found during the outpatient examination, causing L deformation of the nasal wing. The patient had been prescribed anticoagulant therapy for cardiac arrhythmia; otherwise she had not been treated for any other serious illness. The patient's pre-tumor status is shown in Figure 1.

Tumor excision was primarily planned with delayed reconstruction due to unclear clinical margins of the tumor. Histologically, it was a basal cell carcinoma with a positive resection margin, therefore subsequent re-excisions were indicated. Radical resection of the tumor was achieved only after the fourth re-excision, resulting in the loss of half of the soft nose to the right in the tip area, complete loss of the left half of the soft nose and loss of soft tissues of the upper lip and left cheek of 9 × 5 cm. The gradually expanding defect was covered by COM 30 (VUP Brno, Czech Republic) between the individual phases of resection (Figure 2a,b).

Immediately after the radical excision of the basal cell carcinoma, a multi-stage reconstruction of the nose and left facial defect was planned.

The first step in facial reconstruction was to create a stable platform on which nose reconstruction could take place [8]. First, the left face defect was covered in the mean of reverse face-lift advancement, the so-called French plasty [9].

Figure 3a. Defect after complete excision of the basal cell carcinoma with indicated elevation of the French plasty – face advancement in the mean of reverse face-lift.

Figure 3b. Condition after covering the defect with shift, small defects were closed by full-thickness skin transplantation.

Figure 3c. Reconstruction of the inner lining of the nose using a combination of septal pivot flap and turbine flap on the left.

Figure 3d. Condition after reconstruction of the inner lining by both flaps.

A shift of the skin cover of the face medially with the majority coverage of the defect was achieved, the remaining two small defects were closed by a full-thickness skin graft taken from the preauricular area on the right. Thus, skin grafts were implanted into the dorsal defect of the nose with a size of about 3 × 2 cm and on the upper lip on the left with a size of 2 × 1 cm (Figure 3a,b).

After reaching a stable platform [10] a month later, the first stage of reconstruction of the nose itself was performed, when the re-elevated facial flap was rotated into the originally grafted areas of the upper lip and face. At the same time, the inner lining of the nose was reconstructed using a combination of a septal composite pivotal flap [11] and a left ventrally pedicled turbinate flap from the lower turbinate [12] (see Figures 3a,b and 4). Only with the combination of both flaps was it possible to achieve a sufficient size of the inner lining determined according to the contralateral pattern.

The nasal skeleton was subsequently reconstructed by implanting a cartilaginous L-graft harvested from the cartilage of the left sixth rib to form a central frame (Figure 5a). The cartilaginous framework was anchored after cutting the lateral cartilage at the root of the nose with a non-absorbable monofilament suture, caudally anchored to the spina nasalis anterior area. Rotated septal cartilage was fixed to this framework by many non-absorbable sutures, so that a sufficiently stable central nasal support layer was created (Figure 5b,c). The remaining side walls were then reconstructed with septal cartilage and the remaining cartilage of the 6th rib. The nasal wing support layer was reconstructed by implanting conchal cartilages taken from the dorsal approach from both auricles (Figure 5d), which were extraanatomically implanted into both edges of the nasal wings [8,13,14]. In the final phase, the nasal skeleton was covered with a left paramedian forehead flap elevated with the frontal muscle, the donor area was almost closed by forehead advancement, only a small 3 × 1 cm defect was left for secondary healing under Granuflex Thin (ConvaTec, UK) (Figure 6a–c). A month later, the second stage of nose reconstruction took place, during which the forehead flap was thinned by removing the frontalis muscle and the flap was re-fixed to the base using transmural stitches to eliminate dead space under the flap [13]. Simultaneously, a fa-

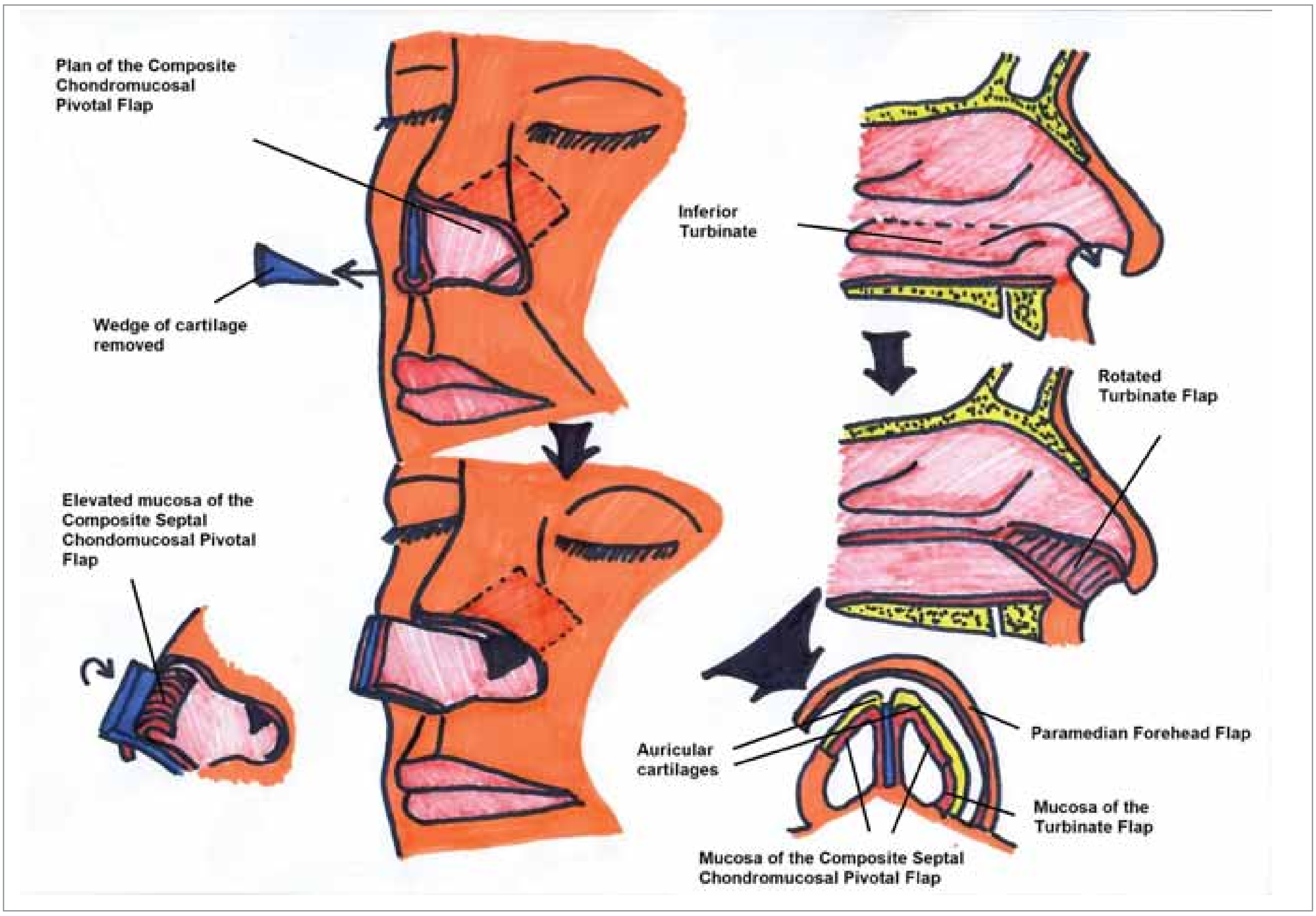

Figure 4. Scheme of innovative reconstruction of the inner lining of nostril (author's drawing).

cial advancement was performed in the mean of rotation to widen the bottom of the left nostril and to insert a wedge of the forehead flap into the area of the soft triangle on the left to widen the circumference of the nostril. In the following month, the reconstruction was completed by removing the nutrient pedicle and reducing the soft tissues on the glabella (Figure 7a,b). Follow up is now 5 months after tumor resection and nose reconstruction, with no signs of recurrence. The patient is now satisfied with the functional and aesthetic result, the current state is presented in Figure 8.

Discussion

The etiology of basal cell carcinoma is not entirely clear; the main risk factor is chronic, long-term exposure of the skin to ultraviolet radiation, which correlates with a more frequent occurrence in old age in sunny areas. Usually, the first physician to diagnose basal cell carcinoma is a dermatologist who, after examination with a dermatoscope for superficial lesions, can perform cryotherapy with liquid nitrogen or other conservative therapy, but this solution is not sufficient for deeper forms of basal cell carcinoma. For this reason, radical surgical resection with a safety margin of 3–15 mm depending on the size of the tumor and subsequent biopsy verification of the completeness of the excision remains the dominant treatment for deep forms of basal cell carcinoma. If the resection margins are not free with a sufficient safety margin, then the tumor very often recurs. Therefore, it is important to perform re-excision until the entire tumor site is safely removed. Basal cell carcinoma usually does not metastasize, its malignancy is mainly manifested locally by its growth and destruction of surrounding structures. The best solution for invading tumors is early surgical removal before the tumor can form large deposits and destroy surrounding structures, such as growth into the orbit, spread through nasal structures, etc. [1,4].

Modern principles of nasal reconstruction are based on five basic rules [10,14,15]:

1. The most suitable flap for the reconstruction of the skin cover is the forehead flap due to its texture and skin color [14].
2. For large complex defects of the nose, when nasal resurfacing is performed, it is more appropriate to use the three-stage technique of reconstruction of the skin cover by the forehead flap, in which the flap thinning phase is inserted (after a 1-month delay) be-

tween the flap harvesting and transfer to the recipient area phase and the flap pedicle removing phase [16,17]. This makes it possible to form a corresponding physiological thin layer of soft tissues on the nasal skeleton.

3. If more than 50% of the subunit is missing, it is more appropriate to remove the remaining tissue of the nasal subunit and replace the entire area of the subunit [18].
4. Reconstruction of the nasal support layer from bone and cartilaginous grafts must be an integral part of the primary reconstruction [5], because otherwise collapse and contracture of the displaced soft tissues occurs and the result of nose reconstruction is not permanent [8,11,16,19].
5. Adequate reconstruction of a well-vascularized intranasal lining is the cornerstone of a successful nose reconstruction [14].

Adherence to these five basic rules is a basic prerequisite for successful nose reconstruction, especially the creation of adequate intranasal lining, on which the entire nose is then built. Its failure leads to a failure of nose reconstruction.

Reconstruction of such a large intranasal lining defect under given conditions requires either the use of a bilateral forehead flap (one flap for intranasal lining and the other flap for the skin cover of the nose) or possibly a free flap [20]. In the first case, the morbidity of the donor site on the forehead increases [13], in the second case the surgical burden and complexity for the patient. In both cases, moreover, the flaps are too thick and obstruct the airways, often requiring secondary thinning of the flaps or enlargement of the airways [8,13].

The composite chondromucosal pivotal flap from the septum alone, on the other hand, does not provide enough mucosa to create adequate nostril circumference. However, the unique addition of a turbinate flap, which due to the arc of rotation can only be used to reconstruct the

Figure 5a. Harvested L-graft to form a nasal skeleton from the cartilage of the left 6th rib.

Figure 5b. Implantation of a cartilaginous L-graft, reconstruction of the side walls with cartilage from the septum and the remaining cartilages of the 6th rib, the nasal wing support layer was reconstructed by implantation of conchal cartilage removed from both auricles.

Figure 5c. Implantation of a cartilaginous L-graft, reconstruction of the side walls with cartilage from the septum and the remaining cartilages of the 6th rib, the nasal wing support layer was reconstructed by implantation of conchal cartilage removed from both auricles.

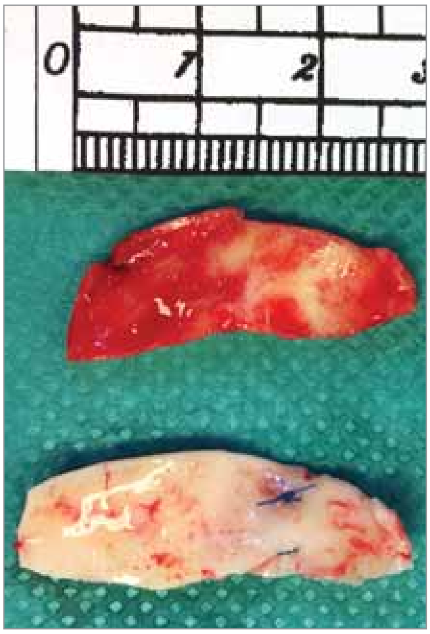

Figure 5d. Conchal cartilage harvested to support the nasal wings.

base of the nasal ala, will allow completing the rest of the perimeter of the nostril to achieve a sufficiently spacious nostril. In addition, it is a thin mucosa that does not obstruct the airways. Although in the reported case this combination of flaps was used only unilaterally, it can also be used bilaterally and thus achieve the recon-

Figure 6a. Condition after covering the skin defect with a left paramedian forehead flap, donor area almost completely closed by advancement, leaving only a small defect of 3 × 1 cm size for secondary healing.

Figure 6b. Condition after healing (2 weeks after the first stage).

Figure 6c. Condition after healing (1 month after the first stage).

Figure 7a. The third stage of reconstruction – the condition after thinning of the forehead flap by removing of the frontalis muscle (second stage), showing thinning and removal of the pedicle.

Figure 7b. Condition after performing a facial advancement in the mean of rotation to widen the bottom of the left nasal nostril and to insert the wedge of the forehead flap into the area of the left soft triangle to widen the circumference of the nostril.

struction of adequate nasal lining for complex subtotal nasal losses affecting the base of the nasal wings.

Another innovation was the combination of an L-graft with a composite pivot flap. The use of the L-graft eliminated the risk of collapse of the rotated composite septal chondromucosal pivotal flap in the area of the nasal dorsum and thus ensured the robustness of the reconstruction of the nasal skeleton while ensuring an adequate position of the rotated composite septal flap.

This reported case of the patient also verified in practice that it is appropriate to plan the reconstruction of the nose into individual stages and that gradual steps can be used to achieve an adequate reconstruction result, which in no way separates the patient from society. The higher aesthetic result of nasal reconstruction using the three-phase forehead flap technique compared to the already obsolete two-phase technique was confirmed again [5,6,8,17].

Conclusion

In basal cell carcinoma, as in other skin tumors, free resection margins should always be achieved before reconstruction. Reconstruction of large nasal defects should be planned in individual steps, so that first a sufficient platform for reconstruction is created and only then the entire nose, including the intranasal lining and skeleton, is reconstructed. The result of the first stage of reconstruction is then corrected in the following stages in terms of achieving the physiological appearance of the nose.

The use of composite septal pivot flap and turbinate flap is an original method that ensures a sufficient diameter of nostrils for subtotal losses and allows avoiding more demanding reconstruction techniques or higher morbidity of donor sites, as we verified in this case report. In addition, the combination of the use of the L-graft and the pivot septal flap eliminates the shortcomings of both separately used techniques, ensures a sufficient framework for the nasal skeleton, and ensures the durability of the achieved result of reconstruction.

Role of authors: Zdeněk Dvořak – operating surgeon, conceptualization, methodology, supervision, visualization, writing – original draft. Antreas Cheimaris – assisting surgeon, data curation, investigation, writing – original draft, and writing – review & editing, photo documentation, methodology. Martin Knoz – investigation, data curation, writing – original draft. Richard Pink – investigation, data curation, writing – original draft.

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Figure 8. The final condition 5 months after the end of the reconstruction: (a) frontal view, (b) half profile view, (c) profile view, (d) bottom view.

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The Use of Dalbavancin with a Dermal Substitute Application – a Case Report

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Summary

Skin and soft tissue infections (SSTIs) are a large group of diseases with a wide range of clinically different conditions, some of which can be immediately life-threatening. A number of bacteria play an important role in the etiology of SSTIs, especially gram-positive cocci *Staphylococcus aureus* and *Streptococcus pyogenes*. In this case report, a young woman with skin defects after a fasciotomy was treated using a dermal substitute application. Multiple infectious complications in the skin and soft tissues with a high risk of development of phlebitis and with significant intolerance to a variety of antimicrobials were observed. The dramatic SSTI was treated using intravenous administration of dalbavancin, a very potent bactericidal antibiotic representing a rational option in the treatment of SSTIs caused by gram-positive bacteria.

Key words

dalbavancin – antimicrobial resistance – skin and soft tissue infection – necrotizing fasciitis – dermal substitute – wound healing

Introduction

The application of dermal substitutes is currently becoming increasingly important in the local therapy of a wide range of acute and chronic full-thickness wounds [1]. Dermal substitutes provide two basic functions of the cutaneous dermal layer: control of pain and scarring. They act as matrices or scaffolds, promote new tissue growth and enhance wound healing. The control of the whole process of scarring after the application of dermal substitutes also leads to a reduction in the risk of pathological scars – hypertrophic or keloid scars [2].

One of the biggest challenges associated with the application of dermal substitutes in general is the risk of developing infectious complications – skin and soft tissue infections (SSTIs). A specific subunit of SSTIs, acute bacterial skin and soft tissue infections (ABSSTIs), is defined as a SSTI with a proven bacterial causative agent together with a minimum affected area of 75 cm^2 [3].

In this case report, we present a complicated case of multiple SSTIs in a young woman at high risk of developing phlebitis and significant intolerance to a variety of antimicrobials, in which we managed to control the dramatic picture with dalbavancin.

Case report

We describe the case of a 39-year-old woman with skin defects after fasciotomy of the left upper extremity and repeated SSTIs in various locations (neck, upper extremity and chest) caused by *Streptococcus viridans* and *Staphylococcus epidermidis*. As for medical history, she suffered from bronchial asthma, congenital deficiency of factor VII, antiphospholipid antibodies, cyclic leukopenia with neutropenia and phagocytic disorder, hypothyreosis after semithyreidectomy due to papillary carcinoma of the thyroid gland, sarcoidosis of lungs, endometriosis grade IV, repeated dysmicrobias and hypomotility of intestines. Furthermore, she had a history of repetitive phlebothrombosis, thrombophlebitis and acute disseminated intravascular coagulation.

Skin defects arose as a complication of a contusion of the left hemithorax, infraction of the ribs (left side) with hematoma followed by an infection. Despite the targeted antimicrobial therapy combined with *Streptococcus viridans* autovaccine, an abscess progressed along the tendon of the musculus pectoralis major to the left arm, causing massive swelling of the left forearm with paresthesia of the fingers. A fasciotomy of the left arm and forearm was performed. After many revi-

Figure 1. Reconstruction and wound closure of the defect after necrotizing fasciitis and fasiotomy. Wound bed preparation (a), application of Matriderm® (b), coverage with STSG (c), follow-up visit with wound closure with no sign of infection – 35 days after surgical procedure (d).

sions of skin defects under general anesthesia, defects were finally covered with Matriderm® and STSG (split-thickness skin grafts) in total on 1.5% TBSA (total body surface area) (Figure 1).The introduction of a peripheral venous cannula guided by ultrasonography in the operating theatre led to a development of phlebothrombosis. Because of that, the cannula was extracted and dalbavancin therapy initiated (1-hour infusion) in accordance with the microbiological results. No further phlebothromboses occurred. The skin defect completely healed and the patient was discharged to our outpatient care and outpatient parenteral antibiotic therapy (outpatient parenteral antibiotic therapy (OPAT)) with C-reactive protein level of 2.7 mg/L. Over the next month, weekly follow-up visits were made and dalbavancin was applied three more times.

Discussion

The treatment of SSTIs is often complicated, in particular due to the ever-increasing resistance of pathogens resulting in the failure of standard antimicrobial treatment. New resistant strains keep emerging at a pace that the development of new drugs can match only with difficulties. Nevertheless, several promising antimicrobials have been registered in recent years.

Dalbavancin (trade names Dalvance® in the US and Xydalba® in Europe) is one such very potent antimicrobial drug with unique pharmacokinetic properties, suitable for long-term therapy. Dalbavancin is a bactericidal antibiotic from the lipoglycopeptide class (the second generation of glycopeptides). Lipoglycopeptides exert their bactericidal activity by binding to the D-alanyl-D-alanine residue on growing peptidoglycan chains, preventing transpeptidation and transglycosylation of disaccharide subunits and hence cell-wall formation. Even though the molecule of dalbavancin itself was defined in the 1980s, it was only approved for clinical application in 2014 (FDA – Food and Drug Administration and EMA – European Medicines Agency) [4]. SSTIs of adults constitute the only approved indication for dalbavancin. Dalbavancin is considered a potent drug effective against a wide spectrum of gram-positive bacteria – in particular, against *Staphylococcus aureus* including MRSA (methicillin-resistant *Staphylococcus aureus*), *Streptococcus* sp., and *Enterococcus* sp. [4].

The main advantage of dalbavancin is its unique, very long, biological half-time reaching 15.5 days (372 hours). It must be strictly used in intravenous dosage form only. There is no need to reduce the dosage of dalbavancin in patients with impaired kidney or hepatic function. Moreover, it is associated with only low occurrence of side effects compared to the glycopeptides of the first generation. Two regimes for dalbavancin administration are currently approved: the primary regime comprises an initial dose of 1000 mg of dalbavancin followed by another dose of 500 mg dosage after 7 days. As of 2016, it is also possible to administer only a single dose of 1500 mg in a 30-minute infusion (proved as non-inferior) [5].

A wide range of antimicrobial agents have been compared to dalbavancin in SSTIs (or, to be more precise, ABSSTIs) treatment. Table 1 shows the comparison of dalbavancin and antimicrobial agents most commonly used in ABSSTIs treatment. It details the MIC (minimal inhibitory concentration) of individual drugs in particular gram-positive pathogens.

Mostly, the effectiveness of dalbavancin was compared to that of vanco-

Table 1. The comparison of MIC90 ranges of dalbavancin and other antimicrobial products used for treatment of cSSTIs (complicated Skin and Soft Tissue Infections) caused by gram-positive bacteria

Antibiotics	MIC90 range (μg/mL)											
	SA	MSSA	MRSA	CNS	ENFA	ENFC	STPY	STAG	STPN	BCsp.	CLDI	CLPE
Dalbavancin	0.125	0.125	0.125	0.125	ND/**0.25**	ND	0.125	0.125	ND	ND	ND	ND
Vancomycin	2	2	2	4	4	4	2	2	2	ND	2	2
Teicoplanin	2	2	2	4	2	2	2	2	2	ND	ND	ND
Daptomycin	1	1	1	1	ND/**2**	ND/**4**	1	1	ND	ND	ND	ND
Ceftarolin fosamil	1	1*	1	ND	NR	NR	**/**0.5**	**/**0.5**	0.25	ND	ND	ND
Tigecyclin	0.5	0.5	0.5	0.5	0.25	0.25	0.125	0.125	ND	ND	ND	ND
Linezolide	4	4	4	4	4	4	2	2	2	ND	ND	ND

SA – *Staphyloccous aureus,* MSSA – methicillin-sensitive SA, MRSA – methicillin-resistant SA, CNS – Coagulase-negative *staphylococci*, ENFA – *Enterococcus faecalis*, ENFC – *Enterococcus faecium*, STPY – *Streptococcus pyogenes*, STAG – *Streptococcus agalactiae*, STPN – *Streptococcus pneumoniae*, BCsp. – *Bacillus* sp., CLDI – *Clostridium difficile*, CLPE – *Clostridium perfringens*). * MSSA sensitivity testing not necessary, sensitivity is expected, ** sensitivity derived from sensitivity to penicillin, NR – natural resistance, ND – not defined. Breakpoints are adopted from EUCAST (European Committee on Antimicrobial Susceptibility Testing), which is binding for Europe. For microorganisms with breakpoints undefined in EUCAST, CLSI values (The Clinical & Laboratory Standards Institute) are shown in bold script, preceded by a slash mark

mycin or linezolid. In all such comparisons, the effectiveness of dalbavancin was the same as in the case of the comparator (87–94% of successfully treated patients with dalbavancin and 91–93% of successfully treated patients with the comparator, respectively) [6].

Another study reports a higher success rate in patients treated with dalbavancin (33 patients, 1000 mg on day 1, followed by 500 mg on day 8) compared to patients treated with SOC (standard of care) vancomycin (34 patients, 1 g/12 hours for 14 days in the treatment of gram-positive catheter infection). Moreover, the non-inferiority of dalbavancin (administered both as 1000 mg on day 1, followed by 500 mg on day 8, and as a single dose of 1,500 mg) compared to linezolid or linezolid in sequential treatment in the therapy of SSTI was also proven [7]. In osteomyelitis treatment, better 3-month outcomes were reported for dalbavancin than for SOC (vancomycin/daptomycin for MRSA and cefazolin for MSSA) [8].

Conclusion

Dalbavancin represents a very potent bactericidal antibiotic with the intended use in the treatment of SSTIs caused by gram-positive bacteria. Owing to the advantages mentioned above, this drug is preferred mainly for OPAT. The greatest limitation nowadays is the price of dalbavancin. However, the OPAT concept allows us to rationalise costs for antimicrobial therapy (costs for OPAT represented only 15–44% of the costs of treatment during the hospital stay, depending on the diagnosis and used antimicrobial drug). OPAT is more comfortable for patients from the psychosocial perspective as well [9]. **Besides, as long-term catheterization is not needed, the occurrence of catheter-related infections is negligible.** Thanks to good pharmacokinetic properties, dalbavancin penetrates not just the skin but bones and synovial fluid as well and we can see an increase in off-label administrations [10,11]. This off-label use has been only, reported in a limited number of publications; however, there are lots of current clinical trials aiming to prove the superiority of dalbavancin in the treatment of osteomyelitis, infectious endocarditis or bloodstream infections (NCT03091439, NCT03426761, NCT03148756) [5].

Role of authors: Lipový, Hladík: Summary, Introduction, Case report, Discussion, Conclusion, Figure 1; Borilova-Linhartova, Hanslianova: Summary, Introduction, Discussion, Conclusion, Table 1.

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Disclosure: All procedures performed in this study involving human participant were in accordance with the Helsinki declaration and its later amendments or comparable ethical standards.

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Gas Gangrene Following Posterior Tibial Tendon Transfer of a 34-Year-Old Patient – a Case Report

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Summary

Gas gangrene is a rare and potentially fatal surgical complication, most often associated with contaminated traumatic wounds or more rarely following cases of abdominal surgery. The following article describes a case of gas gangrene in the right lower limb of a 34-year-old patient following an elective posterior tibial tendon transfer. The surgery was performed in bloodless fashion, utilizing a surgical tourniquet. Fifteen months prior to the procedure, the patient was attacked by a wild boar, resulting in a tear of the upper calf with complete transection of the right common fibular nerve. The patient underwent a total of three acute surgical procedures, of which the third resulted in below knee amputation. The patient then underwent a final corrective procedure and was fitted with a suitable leg prosthesis. In the discussion, three possible pathophysiological mechanisms of gas gangrene development are described – iatrogenic inoculation of bacteria during injection of local anesthetics for conduction anesthesia, iatrogenic inoculation of bacteria during the posterior tibial tendon transfer and activation of latent clostridial spores within the original wound caused by the wild boar. We consider the third mechanism most likely, as boar tusks contaminated with soil and debris are a more likely source of clostridial spores, than sterile surgical instruments. Furthermore, it is likely the surgical tourniquet played a key role in activating latent spores within the patient wound, as changes in tissue oxygen levels are a common cause of spore activation. Thus, we suggest caution in utilizing bloodless operating fields in elective cases with a history of open contaminated wounds, as the iatrogenic hypoxia can potentially activate sporulent bacteria within the patient's wound.

Key words

gas gangrene – amputation – tourniquet – tendon transfer – nerve trauma

Introduction

Gas gangrene is a potentially fatal infection, most often caused by the bacteria *Clostridium* species. It is typically an infection occurring in the setting of contaminated wounds and was frequently described during periods of war [1]. In today's surgical world it occurs rarely, it is most often associated with open trauma or abdominal surgery [2,3]. Recently, a distinct group of spontaneously developed cases of gas gangrene associated with the subspecies *Clostridium septicum* is gaining recognition [4]. Symptoms of gas gangrene include severe pain, fever, soft tissue edema and later massive soft tissue necrosis with crepitus due to gas accumulation [5,6]. Although this complication can be readily diagnosed once late symptoms of necrosis and gas accumulation develop, it may have already reached a stage at which the patient's limb or even life are critically threatened. Therefore, the fundamental problem of this clinical entity remains early diagnosis at a stage when the patient's symptoms are nonspecific, and clinicians rarely consider it a culprit. This is made even more difficult by the relative absence of known risk factors, although several case reports have described immunosuppression, diabetes, malignancies or prolonged tissue ischemia as conditions associated with developing this complication [7–9]. This article describes a rare case of gas gangrene development following an elective surgical procedure, offers three possible mechanisms of gas gangrene development as well as a suggestion of possible prevention.

Description of the case

A 34-year-old otherwise healthy man was acutely admitted to our neurosurgical department on the 10th of November 2017 with a right common fibular nerve lesion at the fibula head, after being attacked by a wild boar during a hunting trip. The patient underwent immediate surgical revision with antibiotic prophylaxis, which verified complete common fibular nerve disruption as well as partial tearing of the biceps femoris muscle.

Figure 1. Complete common fibular nerve paresis of the right leg after 15 months of intensive rehabilitation.

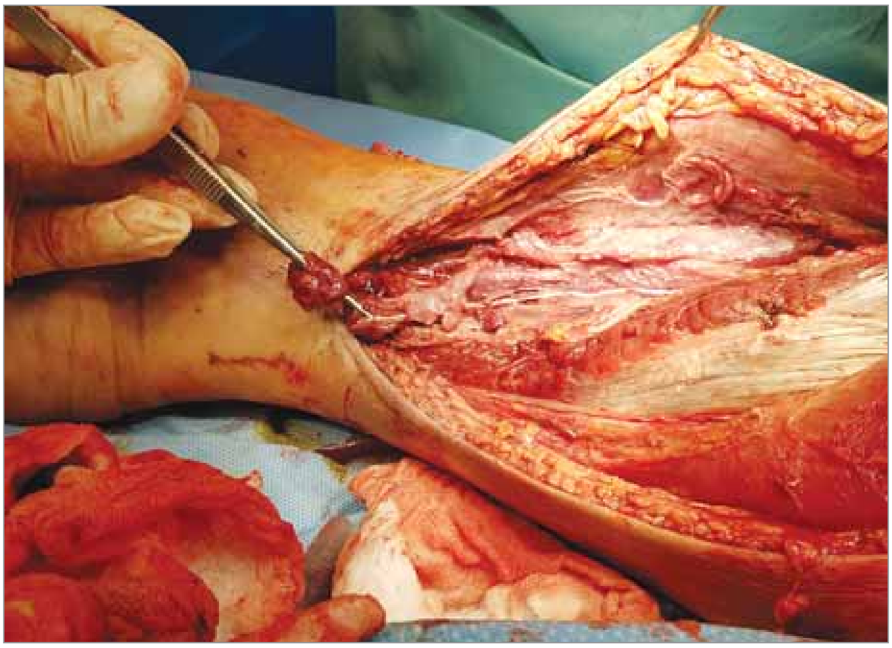

Figure 2. First surgical revision of the patient's right leg following posterior tibial tendon transfer, showing signs of coagulation myonecrosis.

A direct end-to-end microsurgical nerve reconstruction as well as biceps tendon suture were performed. The patient was discharged the next day with a knee orthosis and a planned check-up at our out-patient clinic. Fifteen months after the initial procedure, the patient did not show any clinical or electrophysiological signs of nerve regeneration, despite intensive rehabilitation (Figure 1). After informing the patient of his options, the patient agreed to a posterior tibial tendon transfer to improve function as well as cosmesis of his foot drop. The patient was admitted on the 27th of March 2019 for the corrective procedure, which was performed in local conduction anesthesia in bloodless fashion utilizing a surgical tourniquet. The entire procedure was 79 minutes long. Postoperatively, an orthopedic cast was applied, and the patient was transferred to our standard neurosurgical ward for observation. The immediate postoperative course was uneventful, after regional anesthesia wore off, the patients' right leg was without a new functional deficit, acral perfusion was intact and the surgical wounds were clean and calm with minimal edema. The patient was discharged in the morning of the first postoperative day, with a planned check-up and local analgesics for postoperative pain. Later that day, the patient contacted the operating surgeon due to intensive pain of the operated limb and after consultation was readmitted to the standard patient ward. Clinical examination of the affected limb showed only minor edema with adequate acral perfusion. The patient was administered analgesics and an acute ultrasound was performed on the second postoperative day in order to rule out deep-vein thrombosis or a muscle hematoma. The ultrasound revealed a small hematoma along the calf muscles and because the patient's pain did not respond to analgesic therapy, surgical evacuation was planned the same day. Immediately after skin incision sweet, foul odor filled the room. Further dissection revealed macerated muscle tissue with subtle signs of necrosis, subcutaneous air bubbles and a dark oozieng fluid within the muscle compartments (Figure 2). Cultures were obtained and a trauma surgeon was called immediately in order to perform incision decompression of the lower limb, due to suspected compartment syndrome. The patient was transferred to the intensive care unit and antibiotic therapy targeting anaerobic bacteria was initiated. The next morning (3rd day after tendon transfer), a trauma surgeon inspected the affected limb and indicated revision surgery due to progression of edema, crepitus and reduced acral perfusion. The decompressive incisions were extended, all muscle compartments opened, necrectomies and multiple lavages performed. As all muscle compartments contained necrotic tissue, fulminant gas gangrene was suspected. The patient was again transferred to the intensive care unit with signs of incipient septic shock, antibiotic therapy was intensified to Piperacillin/Tazobactam, Clindamycin, Ciprofloxacin, Metronidazole, and hyperbaric oxygen therapy was initiated. The next day (4th day after tendon transfer), the patient's right limb was cold, pulseless, the skin was livid with delayed capillary return. CT angiography showed minimal perfusion of the right lower limb arteries distal to the knee and a third surgical procedure was indicated. Prior the procedure, the patient was informed that amputation may be the only way to limit spread of infection. Surgical examination of the right limb demonstrated extensive myonecrosis in all muscle compartments and complete thrombosis of the posterior tibial artery without any residual perfusion (Figure 3). After consulting a trauma surgeon, amputation of the limb in the upper calf region was performed (Figure 4). In the following days, the patient's clinical condition stabilized with improvement of local and systemic inflammation. Bacterial cultures demonstrated the presence of *Clostridium perfringens*, thus verifying the primary clinical diagnosis of clostridial gas gangrene. On the 7th day after the original tendon transfer, the patient underwent a final corrective procedure to reshape the limb stump (Figure 5), he was transferred to the standard neurosurgical unit and later the Department of Prosthetics, where he was fitted with a suitable lower leg prosthesis (Figure 6). He was followed up regularly at our outpatient clinic and to this day is fully mobile, capable of household and basic sport activities (Figure 7).

Figure 3. Third surgical revision of the patient's right following posterior tibial tendon transfer, prior to bellow knee amputation.

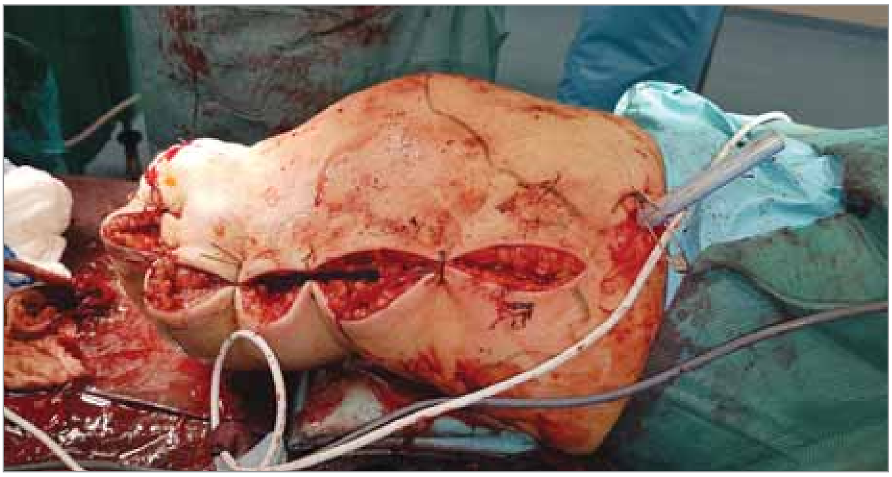

Figure 4. Limb amputation due to severe necrosis and gas gangrene progression.

Figure 5. Result of the final corrective procedure, in order to shape the limb stump.

Discussion

Gas gangrene is a potentially fatal infection, most often caused by the bacteria *Clostridium* species. Causes of these severe infections can be divided into traumatic, postsurgical and spontaneous (non-traumatic and non-surgical) [1]. Traumatic gas gangrene is most often associated with contaminated open wounds and typically occurs

Figure 6. The patient fitted with a suitable lower leg prosthesis.

several hours to several days following trauma [2]. Postsurgical gas gangrene occurs classically after abdominal surgery, although rare cases following orthopedic surgery are described in literature [3]. Spontaneous gas gangrene is the rarest of the three etiologies. It is mostly caused by the subspecies *Clostridium septicum* and is strongly associated with cases of immunosuppression or malignancies [4]. In our case, the patient firstly presented with an open wound injury caused by the tusks of a wild boar, which was contaminated with soil and debris. Fifteen months later he underwent an elective reconstructive surgical procedure in local conduction anesthesia and a bloodless field. It is impossible to retrospectively identify the specific cause of gas gangrene in our patient, however based on current literature, there are three main possibilities.

The first is iatrogenic inoculation of bacteria during injection of local anesthetics for conductive anesthesia. Gas gangrene following injections is a rare event, however several case reports of this complication have been published. Driscoll and Kurnutala have both published cases of gas gangrene occurring after intramuscular injections of adrenaline, analgesics and anabolic steroids respectively [10,11]. They suggest that possible pathogens are needle contamination or activation of silent infection due to local hypoperfusion. Finally, White et al. describe a case of clostridial necrotizing fasciitis specifically after a femoral nerve block [7]. However, in our opinion this pathogenesis is the least likely cause of gas gangrene in our case, because the above-mentioned case reports describe gas gangrene typically originating from the injection point. In our case, the conduction block was performed in the inguinal and gluteal region, proximal the primary site of infection in the calf.

Figure 7. One year after the amputation, the patient engages in hobbies and sports activities.

The second possibility is iatrogenic inoculation of bacteria during the posterior tibial tendon transfer. Although surgical equipment undergoes strict sterilization protocols and rules of asepsis are always followed during surgery, there have been reported cases of gas gangrene following orthopedic procedures. Ying et al. performed a literature review of gas gangrene occurring in orthopedic cases in 2013 [12]. Of the 50 reviewed cases, only three patients developed gas gangrene after elective orthopedic surgery, the remaining cases were associated with simple or compound fractures. Of the three cases, one occurred after hip arthroplasty, one after arthroscopic knee surgery and the last after opponensplasty. The first two cases were caused by *Clostridium septicum*, a subspecies of clostridia which is commonly associated with spontaneous gas gangrene. The third case published by Lorea et al. occurred after an elective abductor digiti minimi transfer due to a traumatic median nerve lesion and was caused by *Clostridium perfringens* [13]. This case is perhaps most similar to ours, however the case report lacks information concerning patient comorbidities (immunosuppression, diabetes, malignancies) all of which are associated with gas gangrene occurrence [8]. Furthermore, the case report does not say whether a surgical tourniquet was used in order to achieve a bloodless field. Finally, Wang et al. recently published a case report of gas gangrene caused by *Clostridium perfringens* after implant removal from the tibia [14]. In this case, a surgical tourniquet was used and in the discussion the authors suggest that hypoxia and vascular damage caused by the tourniquet may have been a contributing factor resulting in gas gangrene. They also suggest immunosuppression of the patient and tight dressing of the surgical wound as possible risk factors for the genesis of gas gangrene.

Finally, the last possible pathogenesis is activation of latent clostridial spores within the original wound caused by the wild boar. Clostridial spores are extremely resistant life forms, which can survive decades within a stable environment and their activation can be brought on by changes in pressure, temperature, or most often tissue oxygen concentration [15]. Therefore, hypoxia caused by the surgical tourniquet could have activated these latent life-forms leading to their proliferation and resulting in gas gangrene. Although this is difficult to prove retrospectively, the use of a tourniquet is considered a risk factor in developing gas gangrene, as are open contaminated wounds [9,12]. In our case, we believe that this pathogenesis to be the most probable in causing gas gangrene of the patient, because the likely source of clostridial spores are the contaminated boar tusks. If this was the case, it would be, to the best of our knowledge, the first-time gas gangrene occurred via a contaminated wound, 15 months after the original trauma.

In conclusion, gas gangrene is a potentially lethal complication of reconstructive surgery. There are many possible mechanisms of developing clostridial myonecrosis, however we believe that in our specific case, the cause of this complication was initiated by the use of the surgical tourniquet, which created anaerobic conditions resulting in activation of latent clostridial spores in the patient's original wound. Thus, we suggest caution in utilizing bloodless operating fields in elective cases with a history of open contaminated wounds, as iatrogenic hypoxia can potentially activate sporulent bacteria within the patient's wound. This should be performed in addition to general surgical wound care such as antiseptic lavage, debridement, sterile dressing and only moderate dressing compression.

Role of the authors: Jan Lodin MD is the first author, who performed the majority of literature research and wrote the discussion and parts of the case description. Ivan Humhej MD, PhD is the operating surgeon of the patient, taking part in all surgeries and provided major editing of the case description. Jana Táborská MD is head of the Department of Prosthetics, taking part in the patient's final surgery and rehabilitation with prosthesis. Furthermore, she recorded follow-up data used in the case description. Prof. Martin Sameš MD, PhD is head of the neurosurgical department and oversaw the entire case as well as performing constructive review of the article

Declarations: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
All procedures within this study were performed in accordance with the ethical standards of and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.
The patient whose case is described, consented to publishing of medical facts of his case, as well as figures showing parts of his body in order to demonstrate specific moments of the case report.

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An Atypical Dorsal Perilunate Dislocation with No Scapho-Lunate Ligament Injury in Bilateral Complex Wrist Injury – a Case Report

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Summary

Perilunate fracture-dislocation is rare. We report a case of a 17-year-old patient with an atypical dorsal perilunate dislocation with no scapholunate ligament injury and an associated contralateral radiocarpal fracture-dislocation. When the initial diagnostic is uncertain, in order not to delay the treatment, computed tomography scan is strongly recommended. The fractures should be anatomically reduced and require a double surgical approach that allows for screw or K-wires insertion and carpal ligaments repair. This pattern of carpal derangement is described in detail. After 12 months the patient is asymptomatic with a total recovery of activities of daily living.

Key words

joint dislocation – fracture-dislocation – ligament injury – wrist injury – fracture fixation

Introduction

Perilunate dislocation and wrist fracture-dislocation are rare and occur most frequently in young patients who sustain high-energy trauma [1], including motor vehicle accidents, falls from a height or contact sporting activities [2]. They are severe injuries involving approximately 7% of all injuries of the carpus [3] that are often missed on initial evaluation in up to 25% of cases [1,2] owing to inexperience personnel interpreting the standard radiographs or because the patient may have multiple injuries, which may lead to inadequate imaging of the upper extremity.

Rarely these injuries occur bilaterally and simultaneously in the same patient [4,5].

We report a case of an atypical dorsal perilunate dislocation with no scapholunate (SL) ligament injury with an associated contralateral radiocarpal fracture-dislocation.

Description of the case

A 17-year-old right-handed male was referred to the Emergency room of our Hospital 12 hours after a high-energy trauma to both wrists after a fall from a height with facial disfigurement and a bilateral swelling of the wrists with complete joints dislocation. On the right side the multiple plain X-rays and computed tomography (CT) showed an atypical dorsal dislocation of the carpus with a dislocated radial styloid process fracture (Figure 1a–c). On the left side the X-rays and computed tomography showed an ulnar translation of the carpus associated to a dorsal perilunate dislocation with no SL ligament diastasis (Figure 1d–g). On the right side through a radial approach an open reduction and internal fixation with a 2.4 mm cannulated screw (Synthes Ltd, Zuchwil, Switzerland) and a single K-wire was undertaken (Figure 2a,b) and a repair of the volar radiocarpal ligaments with 2/0 polypropylene sutures (Prolene®, Ethicon, Sommerville, NJ, USA) through a volar approach was performed (Figure 3a,b). On the left side the normal anatomy of the first carpal row through a volar approach was restored and the volar capsular ligaments were repaired (Figure 4a,b). While an assistant held the lunate and scaphoid in the reduced position relative to the radius, a 1.25 mm oblique pin from the radial metaphysis was temporarily inserted across the radiolunate (RL) joint. The lunotriquetral (LT) ligament and dorsal intercarpal (DIC) ligament were repaired by the use of bone anchors (Minilok Quick Ancor Plus [2-0] Suture; DePuy Mitek, Ober-

Figure 1a. Right wrist. Anteroposterior radiograph showing a dorsal dislocation of the carpus with a dislocated radial styloid process fracture.

Figure 1b. Right wrist. Lateral radiograph showing a dorsal dislocation of the carpus with a dislocated radial styloid process fracture.

Figure 1c. Right wrist. CT reconstruction. Note the radial styloid process following the carpus during the dorsal dislocation.

Figure 1d. Left wrist. Anteroposterior radiograph showing a dorsal perilunate dislocation with no SL ligament diastasis and ulnar translation of the carpus.

Figure 1e. Left wrist. Lateral radiograph showing a dorsal perilunate dislocation.

Figure1f. Left wrist. CT reconstruction. Note the luno-triquetral diastasis with no SL ligament involvement.

dorf, Switzerland) through a dorsal approach and through a radial approach the radioscaphocapitate (RSC) and scaphotrapeziotrapezoid (STT) ligament were reconstructed with 2/0 polypropylene sutures (Prolene®, Ethicon, Sommerville, NJ, USA) and a temporary fixation of the radioscaphoid (RS) and lunotriquetral (LT) joints were performed with 1.25 mm K-wires (Figure 5a,b).

Figure 1g. Left wrist. Sagittal CT scan at the level of the distal carpal row disclosed a rotary subluxation of the scaphoid relative to trapezium and trapezoid. Such a dissociation involves a complete scaphocapitate and STT ligament disruption.

Figure 2a. Right wrist. Anteroposterior view immediately after anatomic reduction, stabilization of the radial styloid with a cannulated screw and K-wire. Note the restoration of the radio-scapho articular surface.

Figure 2b. Right wrist. Lateral view immediately after anatomic reduction, stabilization of the radial styloid with a cannulated screw and K-wire. Note the restoration of the radio-scapho articular surface and the restoration of the volar tilt.

Figure 3a. Right wrist. Intraoperative photograph showing the tear of the radiocarpal ligaments (see the asterisk).

Figure 3b. Right wrist. The volar radiocarpal joint capsule and ligaments repair through a volar approach. Note the ulnar retraction of the flexor tendons and median nerve.

The two wrists were immobilized in a short arm thumb spica for 6 weeks on the right side and for 8 weeks on the left side. Then K-wires were removed and progressive and daily occupational therapy sessions were started till restoration of maximum active (AROM) and passive (PROM) range of motion. At 12-month follow-up (Figure 6a,b) in spite of an ulnar translation of the carpus at standard radiographs on the left side

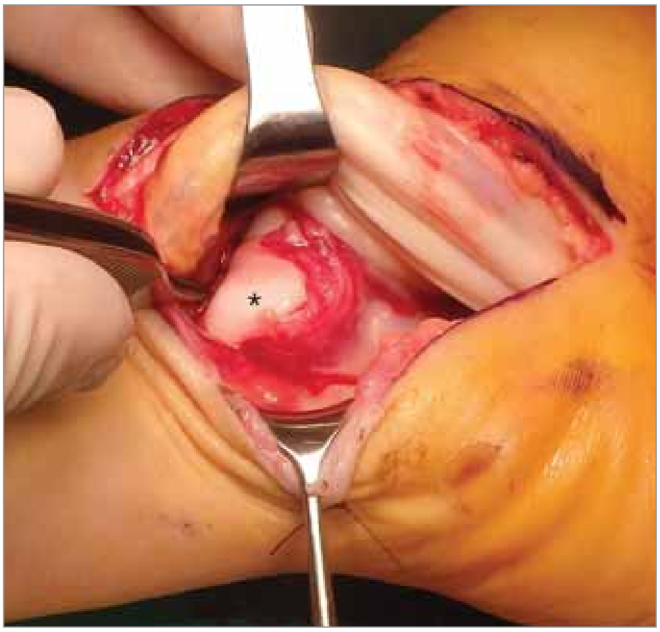

Figure 4a. Left wrist. Intraoperative photograph showing the tear of the radiocarpal ligaments with lunate volar dislocation in the carpal tunnel (see the asterisk).

Figure 4b. Left wrist. The volar radiocarpal joint capsule and ligaments repair through a volar approach. Note the radial retraction of the flexor tendons and median nerve.

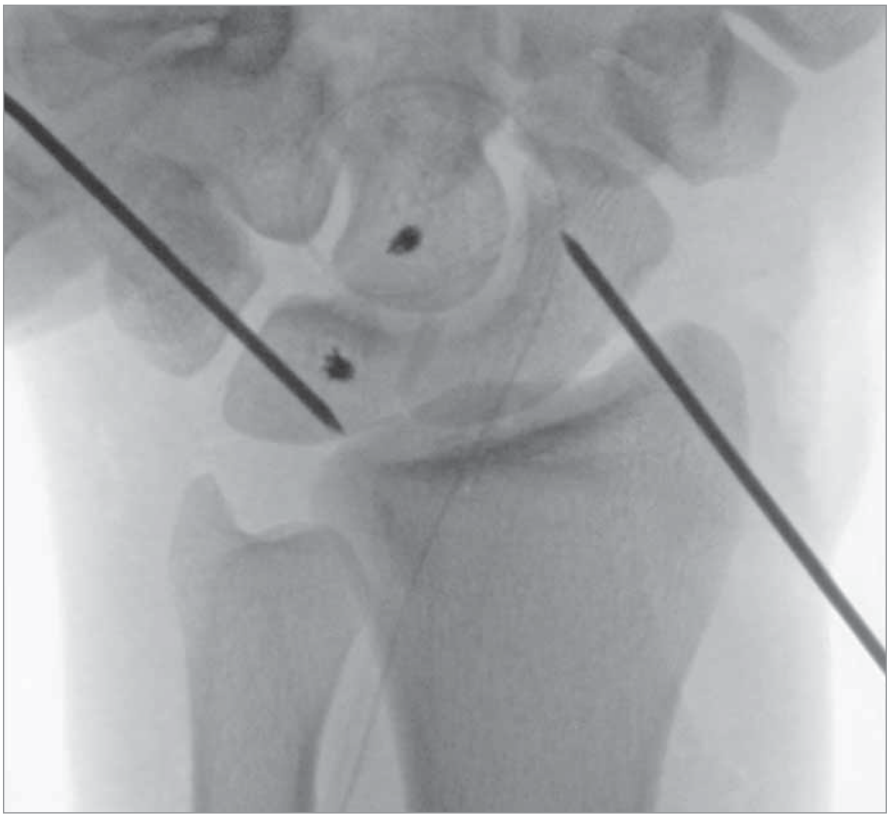

Figure 5a. Left wrist. Anteroposterior view immediately after anatomic reduction, and a temporary fixation of the radio-scaphoid (RS) and luno-triquetral (LT) with 1.25 mm K-wires. Note the restoration of the normal anatomy of the first carpal row with no LT diastasis. Note the suture anchors to restore the luno-triquetral (LT) and dorsal intercarpal (DIC) ligament normal anatomy.

Figure 5b. Left wrist. Lateral view immediately after anatomic reduction, and a temporary fixation of the radio-scaphoid (RS) and luno-triquetral (LT) with 1.25 mm K-wires. Note the restoration of the normal anatomy of the first carpal row. Note the suture anchors to restore the luno-triquetral (LT) and dorsal intercarpal (DIC) ligament normal anatomy.

with no signs of secondary dislocation or ostheoarthritis, the patient is pain-free. He shows an excellent AROM on the right side of 60° of palmar flexion, 70° of dorsiflexion, full supination and pronation while on the left side of 40° of palmar flexion, 40° of dorsiflexion, full supination and pronation (Figure 7a,b). The grip strength measured with the Jamar dynamometer (J.A. Preston, Jackson, Michigan, USA) on the right hand is 50 kg while on the left side is 45.8 kg (normal range scores in a male of comparable age are 40–68 kg) [6]. In spite of the reduction of wrist PROM and AROM the patient reports a complete recovery of activities of daily living and sports.

The patient was informed that data from the case would be submitted for publication, and gave his consent.

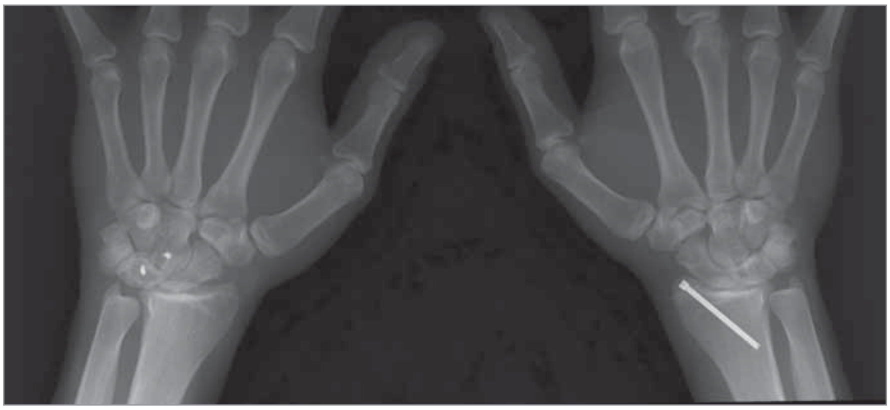

Figure 6a. Anteroposterior view of the wrists at 1-year follow-up. Note the complete consolidation of the styloid fracture on the right side and the moderate ulnar shift of the carpus on the left side.

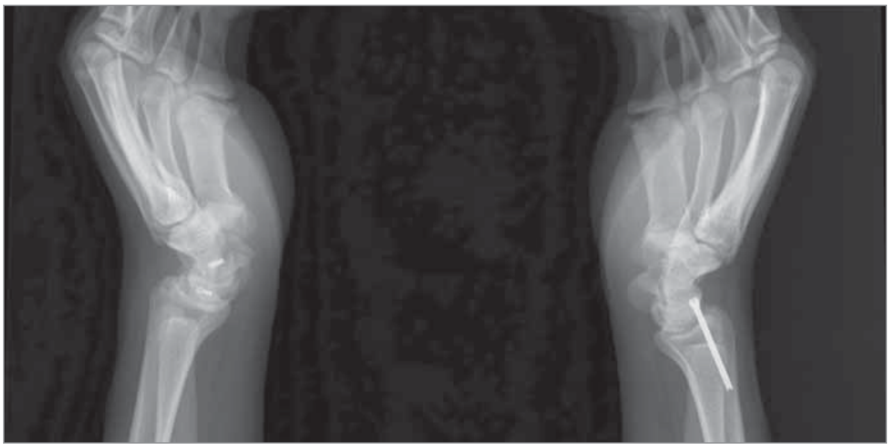

Figure 6b. Lateral view of the wrists at 1-year follow-up. Note the complete consolidation of the styloid fracture on the right side. In the two wrists no signs of DISI (dorsal intercalated segmental instability) or VISI (volar intercalated segmental instability) can be found.

Discussion

Radiocarpal fracture-dislocation is a rare injury, often associated with postoperative pain, stiffness, instability and post-traumatic arthritis [7]. Perilunate injuries, in particular, are the results of high-energy trauma to the wrist, and are frequently associated with other fractures and ligamentous injuries. Most dorsal perilunate dislocation are the result of an extreme extension of the wrist, associated with midcarpal supination and ulnar translation, often secondary to severe trauma as fall from a height or motorcycle accident [1].

The high energy force can disrupt extrinsic and intrinsic ligaments (scapholunate, lunotriquetral, radioscaphocapitate), bones (radial styloid, scaphoid, capitate, lunate) or combination of bones and ligaments [3].

The diagnosis is based on clinical examination and standard radiographs. CT scan must be performed if there is any doubt, in order to avoid a delay in diagnosis, with a precise planning of the procedure, avoiding intraoperative discovery of a fracture or carpal misalignment, defining the type of fracture and revealing any associated ligamentous injuries [8].

Because of their rarity and difficulties of interpretation on standard radiographs by less experienced radiologists or surgeons, up to 25% [1] of perilunate dislocation are often overlooked or misdiagnosed on first assessment.

Treatment options for perilunate instability patterns include closed reduction and cast immobilization, closed reduction and percutaneous pinning and open reduction. As the awareness of the anatomy and biomechanics of these injury patterns has evolved, apart from bone fixation, surgeons have tended toward treatment approaches that attempt to restore the normal anatomy and repair the injured extrinsic and intrinsic carpal ligaments, through open techniques [1,3].

The anatomic relationship between radius, the first carpal row and the capitate has to be restored in association with soft tissue repair on the volar and dorsal side of the wrist to prevent ulnar translation and secondary osteoarthritis.

On the right side, we performed an anatomical reduction of radial styloid and repair of the volar radiocarpal joint capsule. Unlike previous reports [2] we confirm that volar radiocarpal ligaments repair (mainly the radioscaphocapitate ligament) should be recommended to prevent carpal misalignment [3].

Figure 7a. Wrist extension AROM at 1-year follow-up. Note the slightly better arc of range of motion on the right side.

Figure 7a. Wrist extension AROM at 1-year follow-up. Note the slightly better arc of range of motion on the right side.

On the left side we faced an atypical dorsal perilunate dislocation with no scapholunate ligament tear. According to Mayfield [9] most carpal dislocations around the lunate are due to a violent extension, ulnar deviation and supination injury to the wrist initiating at the level of the body of the scaphoid (producing a trans-scaphoid fracture) or through the scapholunate joint, with the palmar scapholunate ligament failing first, with a tear beginning from palmar to dorsal of the proximal membrane and the thicker dorsal scapholunate ligament (stage 1). After disruption of the scapholunate joint, if wrist hyperextension continues, the distal row (mainly the capitate) translates dorsally and dislocates relative to the lunate (stage 2). As the capitate displaces dorsally, the triquetrum–capitate ligaments pull the triquetrum out of its normal position, resulting in a progressive tear of the lunotriquetral interosseous ligament and lunotriquetral ligaments (stage 3). When all perilunate ligaments are torn, the dorsally displaced capitate may exert a palmar translation force to the dorsum of the lunate, resulting in a palmar lunate extrusion into the carpal tunnel (stage 4).

In order to explain why some patients have an isolated lunotriquetral dissociation without scapholunate damage, some authors hypothesised the existence of a reverse or ulnar-sided perilunate pattern of destabilization [10]. According to their studies, if the extended wrist hits the ground on the hypothenar eminence, a violent twisting of the distal carpal row into hyperextension, carpal pronation and radial deviation may follow. Therefore, a particular pattern of ligament disruption, starting at the lunotriquetral joint (stage 1), followed by complete dorsal dislocation of the capitate (stage 2) and disruption of the scapholunate joint (stage 3) may appear. Probably, our patient started such a reverse pattern of destabilization but, for unknown reasons, the traumatizing energy was not spent damaging the scapholunate joint but twisting and disrupting the ligaments between the scaphoid and the distal carpal row, i.e palmarly the radioscaphocapitate, the deeper scaphocapitate, radioscaphoid and dorsolateral scaphotrapezial and dorsally the dorsal intercarpal ligament. Like in a previous report [11] due to the lack of a complete scapholunate dissociation, the case cannot be categorized as a pure reverse perilunate dislocation but as a combined atypical reverse perilunate and axial–ulnar pattern of wrist disruption.

Conclusion

Despite the rarity of the condition, the general principles of management of wrist dislocations are always to be applied. The alternative of combining a palmar and dorsal approach not only for the lunate reduction but also for an anatomic ligament reconstruction on "both" sides is mandatory. In our patient this led to excellent functional results, in spite of mild ulnar translation with no major complications.

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Conflict of interest: None.

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Reconstruction of Extensive Chest Wall Defects Using Light-Weight Condensed Polytetrafluoroethylene Mesh – Case Reports

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Summary

Tumors of the chest wall require extensive surgical intervention, which includes radical resection of the tumor mass followed by reconstruction of the defect. The depth of the defects may vary from a shallow one to a deep defect with exposure of the internal organs. In reconstruction of the chest wall, it is important to ensure the stability of the chest. Advanced synthetic biomaterials in combination with flap surgery are nowadays used as a treatment method of choice. The main advantage of biomaterials is easy manipulation, good fixation and a porous membrane. They are generally well tolerated by the patient. Flap surgery including regional flaps, pedicled flaps and free flap transfer are used for final closure of a deep defect. Shallow defects may be covered by autologous split-thickness skin graft transplantation. We present a series of case reports where we used light-weight condensed polytetrafluoroethylene (cPTFE) Omyra® Mesh TX B. Braun in combination with flap surgery for reconstruction of the chest wall. Different flaps for closure of the defects were used. In all cases the reconstruction of the chest wall was sufficient. One of the keys to success is a good cooperation between the oncosurgeon and the plastic surgeon.

Key words

flap surgery – free flap – reconstruction surgery – tumors of the thoracic wall – synthetic biomaterials

Introduction

Chest wall tumors are classified to benign and malignant tumors and primary and secondary metastases from other body organs. Despite the advances in modern cancer treatment, radical resection of chest wall tumors remains the standard treatment and may be curative. The success of this treatment is based on multidisciplinary team cooperation and each patient is discussed at the oncology indication commission before the surgical procedure. In the case of extensive defects with the necessity of resection of bones, it is always necessary to consider adequate stabilization of the thoracic wall and preservation of its integrity in addition to the closure of soft tissues [1].

The gold standard in these procedures is bridging plate osteosynthesis. With advances in modern medicine, advanced biomaterials are increasingly becoming routine in clinical practice, bringing new possibilities and applications [2]. We present three case studies of reconstruction of the chest wall defects using light-weight condensed polytetrafluoroethylene (cPTFE) Omyra® Mesh TX B. Braun in combination with flap surgery. We want to demonstrate the possibility of restoring the stability of the rib cage without bone transfer or bridging plate osteosynthesis with successful closure of the defect using various types of flaps.

Description of the cases

Case report 1

We present a 66-year-old woman with a histologically verified chondrosarcoma of the sternum without further dissemination according to magnetic resonance imaging (MRI) and scintigraphy scan. Radical resection of the xiphoid and corpus of the sternum was selected as the curative option by the oncology indication committee. The resection was performed with 10 cm margins around the tumor and the resulting defect was 22 × 20 cm wide. During the surgery a macroscopic inspection of the visible part of lungs, mediastinum and upper abdominal wall was performed with no signs of a tumor. Intra-operative frozen section consultation showed the tumor mass was fully removed. Mammary vessels were dissected as recipient vessels for further microanastomosis. Two chest drains Ch 24 were inserted and a Omyra® Mesh TX 22.5 × 30 cm was sutured into the defect with adequate tension by a chest surgeon. There were two

Figure 1. Post-resection defect covered with latissimus dorsi free flap.

Figure 2. The final result 2 weeks after the reconstruction.

small windows in the mesh created for the mammary vessels. The patient was turned into the prone position and free latissimus dorsi flap was elevated, detached and placed on the mesh to cover the defect (Figure 1). After the surgery the patient was transferred to the intensive care unit (ICU) with monitoring vital functions and viability of the flap. An X-ray examination was performed for evaluation of the position of the chest drains and for potential pneumothorax. The flap was covered by autologous split-thickness skin graft (STSG) transplantation a week after the surgery. There were no complications in healing of the flap observed and the patient fully recovered without any limitation 3 weeks after the surgery. The patient is registered in the oncological follow-up with regular check-ups (Figure 2).

Case report 2

We present a 71-year-old patient with secondary tumor of the left lateral chest wall. The patient underwent a resection of the left lower lung lobe for metastatic ductal carcinoma from the left breast 8 years ago. The tumor of the chest wall was histologically verified as a metastatic disease and the positron emission tomography/computed tomography (PET/CT) scan showed it is a solitary lesion in the range of two ribs. The oncology indication committee in cooperation with the chest surgeon recommended radical resection of the tumor mass with wide margins. The patient underwent a spirometry and internal examination prior to the surgery. During the surgery, the chest surgeon removed the tumor mass from the left lateral chest wall with wide margins in the range of four ribs and five intercostal spaces, respectively (Figure 3). A chest drain Ch 24 was inserted inside the pleural cavity and a Redon drain No. 14 was inserted inside the abdominal cavity in the subphrenic space. After the reinsertion of diaphragm, the original defect was approximately 15 × 20 cm wide and was covered by Omyra® Mesh TX 22.5 × 30 cm. The patient was positioned on the right side and a plastic surgeon closed the defect with latissimus muscle flap transposition with a skin island. The rest of the muscle was covered with a rotation flap from dorsolateral mobilization and transposition (Figure 4). In the post-operative period, the patient was monitored at the ICU with antibiotic prophylaxis and regular X-rays of the chest. The chest drain was set to passive drainage on the 5th day after the surgery and was removed on the 7th day. There were observed no complications in the healing of the flap and no overall complications in the post-operative period (Figure 5).

Case report 3

The last case we present is a 51-year-old woman with secondary tumor of the rib cage 6 months after she underwent radical right medial lobectomy for an adenocarcinoma. The primary surgery was performed as a video-assisted thoracoscopic surgery (VATS). Histo-

Figure 3. Left hemithorax resection with exposed internal organs.

Figure 4. The pedicled latissimus flap cover of the defect.

Figure 5. The final result one month after the surgery.

Figure 6. Fixated Omyra® Mesh TX in the chest wall defect.

logical examination confirmed moderately differentiated adenocarcinoma of the lung with no metastasis. Three months after the surgery the PET/CT scan showed suspicious recurrence lesion in the scar originated from the 6th rib, which was later confirmed by a biopsy. An oncology indication committee recommended neoadjuvant systematic therapy with cisplatin/pemetrexed. During the surgery the chest surgeon removed the 6th rib with adjacent soft tissue with 10 cm margins, original scar and one rib above and beneath the tumor as a complex resection. The original defect size was approximately 20 × 25cm. The Omyra® Mesh TX 22.5 × 30 cm was implanted into the defect (Figure 6). For final closure we used a pedicled latissimus dorsi flap, which was not affected by the scar from previous surgeries (Figure 7). However, the range of the skin island was limited by the lack of soft tissue mobility and the rest of the defect was covered by autologous STSG transplantation.

In the post-operative period, the patient was monitored at the ICU with prophylactic antibiotics therapy with regular X-rays of the chest. There was observed a problem in the healing of the STSG which was infected. After debridement we applied Vacuum Assisted Clo-

Figure 7. Elevation of pedicled latissimus dorsi muscle flap for wound closure.

Figure 8. The final result of the reconstruction one month after the surgery.

sure (VAC) therapy and we performed a secondary STSG transplantation with a successful result. Further hospitalization was without complications and the patient fully recovered (Figure 8).

Discussion

Thoracic wall tumors represent a complex clinical problem. In most cases, the treatment of operable tumors should be primarily surgical. Wide surgical resection with sufficient margins of tumor resection gives the greatest chance of recovery or long-term survival [1,3]. Chest wall resection involves disrupting a number of heterogeneous tissue layers. The ribs, intercostal muscles, sternum, scapula and numerous soft tissues may be all removed. Such intervention often leaves a widespread defect revealing vital organs and could significantly reduce their function. The aim of the surgical procedure is therefore the reconstruction of both protective and functional properties of the thoracic wall. This involves maintaining negative intrathoracic pressure, elimination of paradoxical rib motion and rigid protection of vital organs [4,5].

The literature on chest wall resections is relatively extensive, but inconsistent. The optimal procedure is often based on the individual experience of the workplace, which is often limited due to the relatively rare indication for a resection procedure. The risks associated with large-scale surgeries are strongly dependent on the individual experience of the operating surgeon and the quality of subsequent postoperative care as well as availability of material and equipment [1].

When looking at complete reconstruction of the thoracic wall, we must respect all anatomical boundaries and tissues. The key action is the reconstruction and stabilization of the skeletal part of the chest wall to ensure stability [6]. Historically the most commonly used method has been osteosynthesis for bridging multiple rib or sternal defects. There are many materials from all sorts of types, such as steel, ceramics or titanium. The titanium material outperforms the others due to its biocompatibility, osseointegration, resistance to infection, high strength/weight ratio and low optical density. Osteosynthetic material allows very good and physiological rib movement, but its major disadvantage is the high incidence of osteosynthesis failure, either due to fracture or displacement of material [6,7]. Berthet et al. disclose an alarming 44% incidence of osteosynthetic material failure in thoracic wall reconstruction [8]. To ensure chest wall stability, Kalab et al. described the transplantation of allogenic bone graft in combination with titanium plates. He presented 10 cases of allograft of sternum or calva bone and in all of them he achieved excellent chest stability with respiratory sufficiency. However, in 40% there were healing problems of the soft tissue which needed additional re-suture [9].

Synthetic materials in the form of mesh or net used for reconstruction of the chest wall gained popularity in the past years. The spectrum of the different materials is very wide: methylmethacrylate, polyglactin, nylon, polytetrafluoroethylene, silastic, silicone, etc. Their biggest advantage is easy manipulation, sufficient fixation and often good incorporation into the tissues (it is variable according to the material used). Materials are usually easy to stretch and therefore any paradoxical movement is avoided. Most of them are porous, thus preventing the formation of seroma [6]. These materials are generally well tolerated and show good bio-integration properties. There are many specific materials on the market today, often with minimal clinical differences. Jedlička et al. described their experience with polypropylene and polyester covered with polyurethane, which are both very effective with no statistical differences [1]. Experience with synthetic polytetrafluoroethylene mesh shows very similar results [10].

Before the implantation of the mesh, the tumor mass must by fully removed with no further signs of metastasis. Intra-operative frozen section consultation with macroscopic inspection of the surgical field should be considered as a standard procedure. Chest drains are usually inserted in the thoracic cavity before implanting the mesh. The mesh must be sutured into the defect with adequate tension and with light overlap of the margins.

An extensive chest wall defect in combination with the technique mentioned above requires a flap cover for final wound closure. The technique for the soft part of the reconstruction is very well described in the literature. The choice between muscular or musculocutaneous flaps depends on the size of the defect, its location on the thoracic wall, the angle of flap rotation, availability of vascular supply and also on the experience and preference of the plastic surgeon [11]. The most frequently used musculocutaneous pedicle flaps include pectoralis major, latissimus dorsi and rectus abdominis [12]. Many authors prefer reconstruction with the pectoralis muscle, especially in the anterior portion of the chest wall [13]. For reconstruction of extensive defects in the lateral portion of the chest wall latissimus dorsi is the best suited, as it is the largest muscle in the human body [14]. Omentoplasty can also be used as well vascularized tissue ideal for healing. Its rotation is offered especially in the case of resection involving the diaphragm and already established communication with the abdominal cavity [15].

All the flaps mentioned can also be used as free flaps in case of extensive defects or in case of an unfavorable location where the axis for the pedicle is not sufficient. The spectrum of free flaps that can be used is much wider, given the zero limitation of local tissue. Frequently used free flaps include the anterolateral thigh flap (ALT), latissimus dorsi flap, deep inferior epigastric artery perforator flap (DIEAP) and many others, that are dependent upon the preference of the surgeon [16].

After the surgery, it is necessary to monitor vital functions of the patient as well as the vitality of the flap. The patient is usually situated at the ICU for the first week after the surgery. The position of chest drains is regularly checked via X-rays and the drains are set to passive drainage on the 5th day after the surgery and removed on the 7th day. Prophylactic antibiotics are indicated for 1–2 weeks after the surgery if the patient is without complications. At our department, the plastic surgeon takes care of the patient from the reconstruction of the defect until the flap is fully healed and all the skin defects are covered with STSG transplantation. After that, the patient comes under the care of a chest surgeon with oncological follow up and regular check-ups. Plastic surgeon takes care of the flap and donor site during the follow-up. The whole process requires a good cooperation with the chest surgeon in case of any complications.

In the future, no radical change or innovation in reconstruction of the chest wall can be expected. There are several condensed polytetrafluoroethylene meshes on the market (Infinit® – Gore, MotifMESH® – ProxyBiomedical, Omyra® – B. Braun) and also expanded polytetrafluoroethylene meshes (Gore-Tex® Soft Tissue Patch – Gore, Gore Dualmesh®– Gore, Composix® – Bard, Teflon® El – DuPont). In recent years, there has been an upswing in 3D printing and associated "tailor made" implants. However, even these materials require further reconstruction of soft tissues and their cost makes them unavailable for most patients [17].

Conclusion

The reconstruction of deep defects of the chest wall after a radical resection of a tumor is challenging even for an experienced plastic surgeon. Planning the surgery requires intensive multidisciplinary cooperation in order to maintain the oncological radicality and successful closure of the defect. Every case needs to be individually considered as there is big variability in the type of tumor and its localization. Synthetic biomaterials in the combination with flap surgery can provide an excellent chest stability with no need of bone grafting or bridging osteosynthesis. They can be considered as a safe choice due to the low rate of infections and great biocompatibility with surrounding tissues.

Role of authors: All authors listed above were members of the surgical team and have contributed equally to this article.

Declaration: The authors declare they have no potential conflicts of interest concerning drugs, products, or services used in the study. The authors declare that this manuscript has not been published before and is not currently being considered for publication. The authors declare that the study was conducted in accordance with the Helsinki Declaration.

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ČESKÉ SOUHRNY

Rekonstrukce nosu po odstranění bazocelulárního karcinomu pomocí kompozitního septálního pivotálního laloku a turbinátního laloku – kazuistika

Z. Dvořák, A. Cheimaris, M. Knoz, R. Pink

Bazaliomy nosu jsou nejrozšířenější maligní nádory kůže obličeje postihující predilekčně oblasti exponované slunečnímu záření, kam patří mimo jiné i oblast nosu. Po jejich radikálním odstranění vzniká variabilní komplexní defekt postižené oblasti (defekt všech tří vrstev nosu) nebo i kompozitní defekt (zaujímá i přilehlé měkké tkáně v okolí nosu), které jsou obvykle užívány k rekonstrukci dané oblasti. Popisovaná 73letá pacientka s recidivou infiltrativního bazaliomu levého nosního křídla podstoupila čtyři reexcize, než bylo dosaženo histologicky ověřených volných okrajů bez přítomnosti tumoru. Výsledkem byl kompozitní defekt, který zaujímal vrchol dómu pravé nostrily, celou levou polovinu měkkého nosu včetně báze křídla, část horního rtu a defekt přilehlé lícní krajiny velikosti 9 × 5 cm. V první fázi byla provedena rekonstrukce levé tváře a horního rtu posunem francouzské plastiky a transplantací dvou zbytkových defektů kůží v plné tloušťce. Za měsíc v druhé fázi rekonstrukce byla provedena reelavace, posun a rotace laloku a zahájena tříetapová rekonstrukce nosu za použití septal pivot flapu, turbinátního laloku vlevo pro rekonstrukci vnitřní výstelky. Skelet nosu byl rekonstruován chrupavčitým L-štěpem z 6. žebra, septální a konchálními chrupavkami. Kožní kryt nosu byl rekonstruován levostranným paramediánním čelním lalokem, který byl v druhé etapě ztenčen za současného rozšíření dna levé nostrily transpozičním lalokem, v třetí etapě byla odstraněna výživná stopka.U rekonstrukce komplexního defektu nosu a jeho okolí je potřeba vytvořit nejdříve stabilní platformu, na které bude provedena rekonstrukce samotného nosu. Pro dosažení výborného funkčního a estetického výsledku rekonstrukce nosu je vhodné využít tříetapový koncept. V této práci popisujeme unikátní metodu rekonstrukce nosu – kombinaci septálního pivotálního laloku s turbinátním lalokem k rekonstrukci vnitřní výstelky ve spojení s L-štěpem k zajištění stabilní kostry nosu a čelního laloku k rekonstrukci kožního krytu.

Použití dalbavancinu při aplikaci dermální náhrady

B. Lipový, M. Hladík, P. Bořilová Linhartová, M. Hanslianová

Infekce kůže a měkkých tkání jsou rozsáhlou skupinou onemocnění s širokým spektrem klinických projevů. Některé z těchto infekcí mohou bezprostředně ohrožovat život. V rámci etiologie se uplatňuje celá řada bakterií, mezi epidemiologicky privilegované patogeny patří bezesporu gram-pozitivní koky *Staphylococcus aureus* a *Streptococcus pyogenes*. V kazuistice prezentujeme komplikovaný případ mladé ženy s kožními defekty po fasciotomii řešenými aplikací dermální náhrady. U pacientky s výraznou nesnášenlivostí k celé řadě antimikrobiálních preparátů došlo k rozvoji mnohočetných infekčních komplikací v oblasti kůže a měkkých tkání s vysokým rizikem rozvoje flebitid. Dramatický obraz se podařilo zvládnout za pomoci intravenózního podání dalbavancinu, potentního baktericidního antibiotika reprezentujícího racionální možnost v léčbě SSTIs způsobených gram-pozitivními bakteriemi.

Plynatá sněť po transferu šlachy musculus tibialis posterior u 34letého pacienta – kazuistika

J. Lodin, I. Humhej, J. Táborská, M. Sameš

Plynatá sněť je vzácná a potenciálně smrtelná chirurgická komplikace, která je nejčastěji spjatá s kontaminovanými otevřenými ránami, vzácněji se jedná o pooperační komplikaci po výkonech v oblasti dutiny břišní. Kazuistika popisuje případ rozvoje plynaté sněti v pravé dolní končetině 34letého pacienta bezprostředně poté, co podstoupil elektivní šlachový transfer musculus tibialis posterior. Šlachový transfer byl proveden v chirurgickém bezkrví, za použití turniketu. Operačnímu výkonu předcházelo tržné poranění proximálního lýtka divokým prasetem s kompletní transsekcí nervus fibularis communis, které se událo patnáct měsíců před operačním výkonem. Pacient podstoupil celkem tři operační výkony, poslední z nichž sestával z amputace pravé dolní končetiny v oblasti proximálního bérce. S odstupem pak podstoupil čtvrtý korekční operační výkon, který měl za účel formování končetinového pahýlu k následné protéze, kterou byl pacient vybaven. V diskuzi jsou rozebrány tři patofyziologické mechanizmy rozvoje plynaté sněti – iatrogenní inokulace bakterií při blokové anestezii před výkonem, iatrogenní inokulace bakterií při samotném operačním výkonu a aktivace latentních klostridiových spor v původní tržné ráně způsobené divočákem. Vzhledem k tomu, že původní tržná rána byla kontaminovaná bakteriální flórou klů divokého prasete, lze předpokládat, že se jednalo o okamžik zanesení bakteriálních spor do organismu pacienta. Z tohoto důvodu považujeme třetí popsaný patofyziologický

mechanizmus za pravděpodobnější než předchozí dva, které předpokládají zanesení bakteriálního agens sterilními lékařskými nástroji. Za klíčový okamžik taktéž považujeme použití chirurgického turniketu při šlachovém transferu, protože změny v koncentraci tkáňového kyslíku bývají často spojované s aktivací anaerobních spor. Z tohoto důvodu doporučujeme zvážit užívání bezkrevného chirurgického pole při operačních výkonech pacientů s anamnézou otevřených chirurgických ran v blízkosti operačního pole.

Atypická dorzální perilunátní luxace bez poškození skafolunátního vazu při oboustranném komplexním poranění zápěstí – kazuistika

S. Passoni, M. Arigoni, T. Kanatani, S. Lucchina

Perilunátní zlomeniny-luxace jsou vzácné. Uvádíme případ 17letého pacienta s atypickou dorzální perilunátní luxací bez poranění skafolunátního vazu a současné kontralaterální radiokarpální zlomeniny s luxací. Je-li počáteční diagnóza nejistá, důrazně se doporučuje provedení počítačové tomografie, aby nedošlo k prodlení v léčbě. Zlomeniny by měly být anatomicky reponovány a vyžadují oboustranný chirurgický přístup, který umožňuje zavedení šroubů nebo K-drátů a reparaci karpálních vazů. Tento modelový případ karpálních luxací je podrobně popsán. Po 12 měsících je pacient asymptomatický s úplným návratem ke každodenním činnostem.

Rekonstrukce rozsáhlých defektů hrudní stěny pomocí síťky z expandovaného polytetrafluoretylenu

P. Šín, A. Hokynková, P. Peňázová, T. Horváth, P. Rotschein, J. Holoubek

Nádory stěny hrudníku vyžadují rozsáhlou chirurgickou péči zahrnující radikální resekci tumorózních hmot s následnou rekonstrukcí defektu. Hloubka defektu se značně liší od povrchových až po hluboké rány s obnažením vnitřních orgánů. Při rekonstrukci hrudní stěny je důležité zajistit stabilitu hrudníku. Pokročilé syntetické biomateriály v kombinaci s uzávěrem defektu lalokem jsou v současnosti používány jako metoda první volby. Hlavní výhody biomateriálů jsou snadná manipulace, dobrá fixace a porézní membrána. Pacienti je dobře tolerují. Pro zakrytí se používají místní, stopkované či volné laloky. Povrchní defekty mohou být kryty dermo-epidermální štěpem. V naší práci prezentujeme několik kazuistik, kde jsme k rekonstrukci hrudní stěny po odstranění nádoru použili expandovaný polytetrafluoretylen (PTFE) Omyra® Mesh TX B. Braun v kombinaci s různými druhy lalokových plastik. Ve všech případech se lalokové plastiky plně přihojily. Jedním ze základních pilířů úspěchu je dobrá spolupráce mezi onkochirurgem a plastickým chirurgem.

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