

Upper Limb Emphysema: Noninfectious Background

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Abstract

This case occurred at Vascular Surgery Department-Mansoura International Hospital-Egypt. The patient complained of upper limb edema, crepitation, in spite of no medical or surgical history. A rare type of emphysema detected in this patient after laboratory and clinical work up and after exclusion of other differential diagnosis and the patient managed well and discharged after one week admission and follow up.

Keywords: Emphysema; Hand infection; Crepitation; Necrotizing fasciitis; Upper limb oedema

Highlight

The following case highlights the importance of careful history, clinical and laboratory examinations to reach the final diagnosis and prognosis.

Case Study

A 21 years old female presented to vascular surgery department outpatient clinic – Mansoura international hospital –Egypt at April 2019, with history of chronic potentially clean sinus in the right cubital fossa. The patient gave a history of forearm cephalic vein cannulation followed by mild phlebitis 2 months earlier with no other medical or surgical history. The wound was irrigated, cleaned and closed with adhesive skin strips. She leaved the clinic with analgesia without any radiological evaluation.

Five days later the patient came back to the emergency department complaining of extensive swelling of the right forearm, mild inflammation and mild crepitus sensation in the forearm. The investigations requested: CBC, arterial and venous duplex ultrasound and Radiograph of the right forearm, revealed subcutaneous emphysema from distal arm to the dorsum of wrist. The patient admitted to our vascular surgery department for further investigation and deciding the plan of management (Figures 1 and 2).



Figure 1: Plain X-ray film of the hand showing inflammatory reaction and gases.

The patient had localized redness at the wound site on cubital fossa. Crepitus was palpable throughout the forearm of both flexor compartments extending proximally into the distal arm and distally onto the dorsal aspect of wrist. Radiographs of the forearm and arm revealed air in the subcutaneous tissues of the right lower arm, whole forearm and dorsal aspect of the wrist [1].

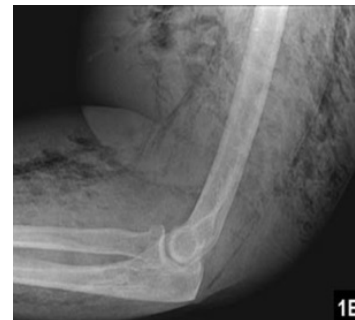


Figure 2: Plain X-ray film of the forearm showing inflammatory reaction and gases.

The patient was afebrile with stable vital signs. There was no evidence of infection on the blood tests with normal white cell count and C-reactive protein (CRP). A dressing was applied over the sinus and the arm rested in a sling.

The patient was admitted for observation and prophylactic antibiotics. Swab taken from the wound was negative for any microorganisms. We investigate hardly for obvious causes of crepitus, unfortunately we did not catch any point of interest despite radiological, hemodynamic and immunological workup [2,3].

Three days later, the following decision was taken:

Surgical exploration and muscular release of flexor compartments of the forearm and dorsum of the hand under sedative anesthesia. The wounds closed by wide non-absorbable sutures and light creep bandage. On follow-up, the edema resolved and crepitus disappeared gradually (Figures 3 and 4).



Figure 3: Surgical sutures closing the wound after doing release.



Figure 4: Surgical sutures closing the wound after doing release.

Discussion

Benign subcutaneous emphysema has been reported to result from varied causes including:

Irrigation of wound with hydrogen peroxide, airgun, power or pneumatic tools.

Migration of internal fixation devices.

After self-harm, surgical procedures on hand.

Dental extraction.

Insect bite.

Benign subcutaneous emphysema of the hand and upper limb of non-infectious etiology has been documented in several case reports. It is important to differentiate this condition from life threatening conditions like gas gangrene (clostridial myonecrosis) and necrotising fasciitis as the treatment and outcome differ considerably (Figure 5).

	Benign subcutaneous emphysema	Gas gangrene / Necrotising fasciitis
Onset	Following break in skin, most often trauma Within 6-8 hours	No history of trauma About 12-18 hours
Development	Well	Ill
General condition	Usually absent	Features of infection
Local signs	Within normal limits	Features of infection / sepsis + involvement of deeper layers and muscle planes
Blood Investigations	Limited to subcutaneous tissue	
Emphysema on radiographs	Mostly conservative / Supportive	Surgical, May need repeated debridement
Treatment	Good, self-limiting	Progressive, life threatening
Prognosis		

Figure 5: The difference between benign subcutaneous emphysema and gas gangrene and necrotizing fasciitis.

Ball valve mechanism

Most authors agree that benign surgical emphysema results when air is sucked through a break in the skin which acts like a 'ball valve type mechanism'. Crampton proposed that application of bandage and mobilization creates a 'ball-valve' effect at the elbow resulting in extensive subcutaneous emphysema [4].

Most puncture wounds around the joint less than 0.5 mm without contamination can be managed with dressing and a course of antibiotic according to local guideline. It is important to immobilize the joint by arm sling or back slab to prevent a 'ball-valve' mechanism occurring around a hinge joint like elbow [5-12].

Conclusion

Benign subcutaneous emphysema of the upper limb may result from a number of causes.

A careful history and identification of typical features can help in the diagnosis of benign subcutaneous emphysema.

A timely diagnosis can help avoid unnecessary surgery as most cases can be treated by supportive measures.

It should be differentiated from gas in the soft tissues resulting from other life threatening conditions as the treatment and outcome of the two differ widely.

It also highlights the fact that not all cases of subcutaneous emphysema are due to gas gangrene.

References

1. Crampton JA (2005) An unusual case of surgical emphysema. *Injury Extra* 36:225-227.
2. De M, Stevenson J (2001) Subcutaneous emphysema of upper limb. *Emerg Med J* 18: 522.
3. Fox A, Sheick H, Ekwobi C, Ho-Asjoe M (2007) Benign surgical emphysema of the hand and upper limb: Gas is not always gangrene-A report of two cases. *Emerg Med J* 24: 798-799.
4. Onwochei VE, Kelly ME, Lyons R, Khan W, Barry KM (2015) Benign subcutaneous emphysema: A case report with bite. *Int J Surg Case Rep* 9: 89-91.
5. Van der Molen AB, Birndorf M, Dzwierzynski WW, Sanger JR (1999) Subcutaneous tissue emphysema of the hand secondary to noninfectious etiology: A report of two cases. *J Hand Surg Am* 24: 638-641.
6. Filler RM, Grimscom NT, Pappas A (1968) Post traumatic crepitation falsely suggesting gas gangrene. *N Engl J Med* 278:756-761.
7. Green RJ, Dafoe DC, Raffin TA (1996) Necrotising fasciitis. *Chest* 110:219-229.
8. Stevenson J (1995) Sucking wounds of the limbs. *Injury* 26:151-153.

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9. Mink van der Molen AB, Birndorf M, Dzwierzynski WW (1999) Subcutaneous tissue emphysema of the hand secondary to noninfectious aetiology: A report of two cases. *J Hand Surg* 638-641.
 10. Filler R M, Griscom N T, Pappas A. Posttraumatic crepitation falsely suggesting gas gangrene. *N Engl J Med* 1968278758-761.
 11. Butt M, Hird G F (1990) Surgical emphysema of the dorsum of the hand. *J Hand Surg* 379-380.
 12. Ozalay M, Akpınar S, Hersekli M (2003) A Benign noninfectious subcutaneous emphysema of the hand. *Arch Orthop Trauma Surg* 433-435.