



Case report

Hand compartment syndrome secondary to contrast media extravasation: A case report



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ABSTRACT

Introduction: Contrast media extravasation injury is a recognized complication of contrast media use. Compartmental syndrome of the hand secondary to contrast extravasation is exceptional. We describe a case of compartment syndrome of the hand secondary to contrast media extravasation.

Case presentation: We present a 47-year-old woman with a history of pulmonary embolism who was diagnosed of compartment syndrome of the left hand after injection of contrast medium during a CT scan. Whose first diagnosis was mild contrast medium extravasation injury 24 h before the compartment syndrome. Standard radiography showed an accumulation of contrast medium in the left hand. The patient underwent a fasciotomy and secondary healing. Follow-up showed good radiographic, clinical, and hand function after 2 months.

Discussion: The occurrence of hand compartment syndrome secondary to contrast media extravasation is rare. Most of the time, they are initially diagnosed as medium extravasation before the worsening of symptoms. Because of its unknown incidence, treatment is not codified. The goal of treatment is to save the limb and restore function. This can be achieved rapidly with early surgery because of the unpredictable course.

Conclusion: Contrast media injection is not a harmless gesture. Hand compartment syndrome after contrast extravasation is rare and is a severe injury, our experience with this case suggests that early surgery helps save the limb and restore function. Always fear a compartmental syndrome in case of extravasation of contrast medium.

1. Introduction

Contrast medium extravasation is the accumulation of contrast medium outside the vessels during the injection phase of imaging. It is a well-known complication seen during the injection phase for CT, X-ray or MRI. This complication is seen in 0.25 % to 0.9 % of all injection procedures [1].

Risk factors for extravasation include previous chemotherapy, use of a hyperosmolar iodinated product, use of a large volume of product, injection site, age and psychological state of the patient, and use of a high infusion pump machine [2,3].

The first symptoms occur at the time of the injection and in most cases evolve to minimal swelling and erythema [2]. These symptoms usually disappear with medical measures and small steps such as application of ice packs, analgesics and the use of steroids [1]. Exceptionally, with a large volume of contrast medium injection, the patient

may develop an acute compartment syndrome [1,4]. This complication is rare and its incidence is unknown [3].

The treatment of compartment syndrome secondary to contrast extravasation remains controversial [3,5]. The decision to proceed or not to surgery is a difficult moment for the physician [1,2,4,6].

Our objective is to describe the case of a 47-year-old woman who presented with acute compartment syndrome of the left hand secondary to contrast extravasation and to compare our case with others described in the literature.

The work has been reported in line with the SCARE criteria [7].

2. Case presentation

A 47-year-old woman, who had undergone a thoracic vascular angiography for pulmonary embolism one year ago with an unremarkable course, came for a thoracic CT scan for suspicion of a new

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pulmonary embolism.

For the preparation of the examination, we had to place an 18G venous catheter of the left hand without local anaesthesia. After injecting 100 ml of iodinated and hyperosmolar contrast medium by a self-regulating infusion pump without alarm function, she felt a burning sensation and minimal swelling of the hand, the computer showed no image after the examination. The patient was placed on simple measures including: ice dressing and hand elevation.

24 h after the incident, the patient complained of continuous pain and swelling of the hand coupled with blisters and skin necrosis (Fig. 1A). The fingers were also swollen, and the distal tips of the fingers began to be pale. We went for a compartment syndrome of the left hand. We perform an x-ray of the hand, which showed significant

accumulation of contrast material in the extravascular spaces (Fig. 2A). We concluded to hand compartment syndrome after extravasation of contrast medium.

The patient was taken to the theatre for two fasciotomy incisions completed by progressive debridement and second-line healing (Fig. 1A). On the first day, the contrast medium disappeared on radiography and the pain disappeared (Fig. 2B). On day 7, the inflammatory phenomena were abolished and the fingers became stiff. The post-operative course is marked by a necrosis of the well-defined skin (Fig. 1C). After two months, the wound healed with complete finger mobility after physical therapy (Fig. 1D).



A



B

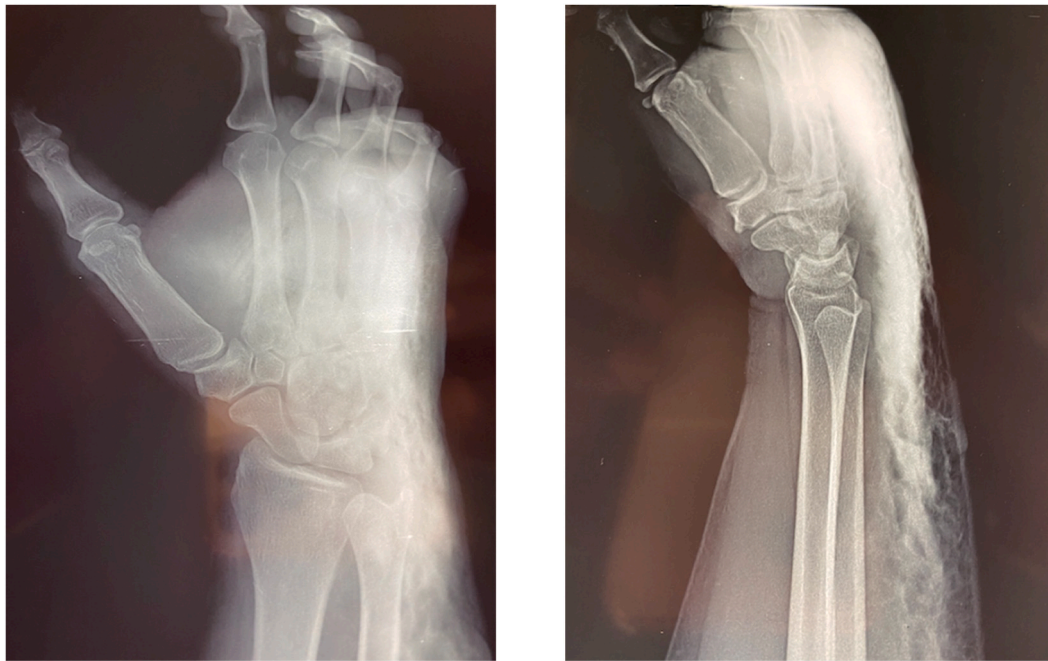


C



D

Fig. 1. A Image preoperative showing the hand; tissue tension, global swelling, blisters and skin necrosis in the dorsal region. B fasciotomy with longitudinal incisions centered over the second, fourth metacarpals and arm. C necrosing tissues after one week D completely healing wound after 2 months.



A



B

Fig. 2. A accumulation of liquid in extravascular space. B normal X-ray 24 h after surgery.

3. Discussion

Imaging studies have evolved significantly in recent years, with the use of contrast enhancement [2]. A recognized complication is extravasation of general or local contrast media, with an incidence of 0.25 % to 0.9 % during all injected procedures [1].

The authors described risk factors associated with this complication, such as use of a small catheter, high infusion pump, venous disease,

injection into the hand, chemotherapy, especially the use of large-volume contrast media containing iodine or hyperosmolar product, inability to speak [1,2,4]. In our case, the risk factors present were: the use of iodine and hyperosmolar products, a large volume administered (100 ml) by a high hand infusion pump.

Three stages of severity have been described in contrast extravasation. Mild extravasation injury with only pain and small swelling that is relieved by small measures such as: an ice pack and hand elevation

[1,4]. Moderate extravasation injury with more severe onset such as moderate to severe erythema, blistering or marked pain or swelling, or injuries for which additional treatment is not needed. In all cases, all signs and symptoms resolve within 2 weeks [4]. Severe extravasation injuries that manifest as compartment syndrome are rare, skin necrosis or blister [4]. Only a few cases are described in the literature [3,8]. Longer-term adverse effects last longer than 2 weeks and sometimes require surgical treatment [1,4,6]. The risk factors associated with severe extravasation injury are: a large volume (>50 ml), the iodine and hyperosmolar nature of the product, the injection site being the hand [1–4]. In our case, the patient had all these risk factors.

Symptoms started at the same time as the scan proceeded with a slight swelling and burning sensation. We treated it as mild extravasation injury. This represents the most common presentation of extravasation injury [3]. These are treated with conservative measure, like in our case. Rarely, as in our case, the patient may develop an acute hand lodge syndrome afterwards which is found in severe extravasation injury. Belzunegui and Jae-Won Jung describe this evolution in her cases, suggestive to the unpredictable evolution of this injury and the incidence of this complication which is responsible for a delayed diagnosis [2,3]. The delays between the examination and the development of compartment syndrome can be attributed to the progressive toxic effect of the product in a tissue [9]. This delay has reported by Varacallo with extravasation injury of propofol [10].

There is no consensus on the management of this injury. Many authors such as Eui Jin Hwang et al. reported in their series of 142,651 patients that medical treatment is sufficient even in moderate and severe extravasation injuries [4]. Wang et al. obtained the same result in a series of 70,000 patients and concluded that there was no need for surgical treatment [1]. Even more, Cohan et al. demonstrated that 80 % of patients with extravasation trauma resolve spontaneously within the first 24 h [11]. However, 7 % will continue to present with symptoms after 24 h, meaning that the development of complications is not predictable. This evolution may be a consequence of the toxic effect of the product on the tissue. Thus, early surgery in the absence of complications will improve short- and long-term patient outcomes and reduce the toxic effect of the product on soft tissue [8,9]. In our case, the initial management consisted of an ice dressing which was unsatisfactory and progression to a severe extravasation injury like compartment syndrome led to surgical management which was done after 24 h. Follow-up after 1.5 months showed a completely healed wound with stiffness of the fingers as sequelae. After 2 months, hand function was completely restored.

Many surgical techniques are described for the treatment of hand compartment syndrome secondary to extravasation injury: fasciotomy, lavage and drainage, early multiple incisions, and evacuation [8,9,12]. The gold standard for extravasation is the subcutaneous suction shower technique described by Gault, which consists of liposuction combined with physiologic serum lavage [9]. The short-term advantage is to preserve the tissues from the toxic effect of the product, after 24 h the patient can be free of any complaints. In the long term, this avoids stiffness and the need for long-term dressings as in our case. The main complication is aggravation of the tissue lesion. We opted for a fasciotomy and progressive debridement because of the presentation with skin necrosis and this was the only treatment available in our context.

4. Conclusion

Contrast media injection is not a harmless gesture. Hand compartment syndrome secondary to contrast media extravasation is exceptional. The diagnosis is clinical and the cause is confirmed by standard radiography. Our experience with this case suggests the value of early surgery for vital prognosis and hand function. This can be applied to all cases due to the unpredictable evolution of all contrast extravasations. Always fear a compartmental syndrome in case of extravasation of contrast medium.

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Ethical approval

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Consent

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Author contribution

Badara Diop, Guillaume Tcheutchoua SOH and Armel Franck Tene NDE these authors participated in the making and correction of this document. All authors agreed with the publication of the document.

Registration of research studies

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Declaration of competing interest

The authors report no declarations of interest.

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