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Necrotizing Fasciitis Caused By Intra Muscular Injection Complication Managed By Skin Grafting – A Case Study

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Abstract-

Intra muscular injection are the most frequently used invasive device in hospitalised patients. They are commonly associated with complications such as vascular damage, muscle contracture, nerve injury due to IM injection and injections site reactions such as redness and swelling, which may occur. It causes further necrotizing fasciitis. In such cases after debridement of necrosed infected wound skin loss occurs which posing a challenge for surgeons to cover the wounds. As a result, in the last few decades, various techniques such as negative pressure therapy, partial and full-thickness skin grafts, and the use of different flaps have been implemented. This article aims to discuss the use of skin grafts to manage the necrotizing fasciitis. It will also present a case study of a 44-year-old male patient who suffered with necrotizing fasciitis due to intra muscular injection complication over right gluteal region, wound bed prepared by surgical necrotectomy or wide sharp debridement with giving antibiotics according to culture and sensitivity. The wound was covered with a split thickness skin graft, which showed good evolution and excellent aesthetic results.

Keywords- Necrotizing fasciitis , split thickness skin grafting , complication of intra muscular injection

Introduction

Intramuscular injection is the most frequently performed procedure in hospitals for drug administrations. Approximately 33-67% of outdoor patients and hospitalized patients require at least one intra muscular drug administration. Delivered by intramuscular (IM) injections, Long Acting Injections (LAI), offering comparatively long term medicinal effects from several weeks to several months, are gaining much attention [1,2,3,4]. However, there are dangers such as vascular damage, muscle contracture, nerve injury due to IM injection [5,6,7,8,9], and injections site reactions such as redness and swelling, which may occur [10,11] . In particular, oily formulation LAIs, which have been designed so that the drug metabolizes in the muscle, contain aspects warranting careful attention, such as being more irritant than the usual medicines [12]

Necrotizing fasciitis is one of the sever complication of intra muscular injections. Necrotizing fasciitis (NF) is a rapidly progressing bacterial soft tissue infection that can lead to sepsis, systemic toxicity, multiorgan failure and a potentially fatal outcome [13,14]. NF has multiple causes, risk factors, anatomical locations, and patho-genic mechanisms, and results in widespread tissue destruction, which may extend from the epidermis to the deep musculature. Mortality is high and even the survivors have a long clinical course. An early clinical suspicion and diagnosis are vital to the outcome, but an accurate diagnosis is reached in only 15% to 34% of patients at the time of presentation [15].

The treatment of necrotizing fasciitis is surgery, and no time should be wasted calling for a surgical consult. The earlier the surgery is undertaken, the better the outcome. The surgery requires extensive, wide debridement of all necrotic tissues. In some cases, a second look surgery may also be required. Early surgery may help minimize tissue loss and eliminate the need for amputation of a gangrenous extremity. With wide debridement, the wounds need to be left open and are packed with wet gauze. Daily dressing changes are mandatory. As long as the necrotic tissue is removed, the patient's recovery is faster.

Once all the necrotic tissue is removed and there is evidence of granulation tissue, In most cases, primary closure is not possible, and hence the surgeon may be required to reconstruct the soft tissues and close the wound with a muscle flap. If there is no adequate natural skin available for a skin graft, then one may need to use artificial skin. The practice of skin grafting dates back to the third century after Christ, when full-thickness grafts were first used. Ancient civilizations such as the Indians, Egyptians, and Romans used rudimentary techniques to apply skin from one body part to another. Sushruta, an ancient Indian physician, is considered the “father of surgery” and described techniques for reconstructing damaged noses and ears using skin grafts. Split-thickness grafts have since been used, sometimes even in conjunction with suction technology tools. This article aims to discuss the use of skin grafts for wound coverage.

Case study

A 44 year old male patient presented at OPD with complaints of severe pain with necrotizing skin and foul smell over right gluteal region of approx size 15 × 15 cm (Fig.01) since 04 days, patient is in hypotension with tachycardia with the history of continues fever with history of intra muscular injection taken at private hospital. Patient was admitted in ICU resuscitation with IV fluid management and broad spectrum antibiotic coverage given.

Wound bed prepared by surgical necrotectomy or wide sharp debridement (Fig.02) under spinal anesthesia. Antibiotics given according to culture and sensitivity report with daily dressing done with antiseptic solutions for 45 days(Fig.03).

After occurring healthy granulation(Fig.04) we planed for split thickness skin grafting (STSG) under spinal anesthesia. Pre-operatively, wound bed (recipient’s site) prepared by scooping and freshened up margins of wound. Intraoperatively, split thickness skin graft harvested from anterior aspect of ipsilateral thigh (donor’s site). The STSG inset at recipient’s with staple(Fig.05), bactigrass ,moist pads and bandaging done.

Post operatively intravenous antibiotic inj. linid 600 mg given twice a days for 5 days according to culture and sensitivity report. When (recipient’s site) uncovered five days later, 90% of the graft had integrated successfully. Dressing process repeated one after 5 days graft integrated very well (Fig.06); staples are removed. After discharge upon subsequent review in the outpatient setting, the graft demonstrated complete up taken.

Pathophysiology

Infection rapidly spreads along the fascial planes and causes micro-vascular occlusion which leads to liquefactive necrosis at all tissue levels. The overlying skin initially appears unaffected, but after several days, it becomes warm, erythematous and tender. Skin breakdown usually begins in 3 to 4 days and is accompanied by subcutaneous emphysema and cutaneous gangrene. With the onset of cutaneous gangrene, pain becomes reduced secondary to destruction of superficial cutaneous nerves. Advanced stages of NF are characterized by systemic symptoms, such as high grade fever, tachycardia, hypotension and sepsis [16].

Clinical symptoms

Severe pain over the involved skin and underlying muscle is the hallmark symptom. The intensity of pain may cause suspicion of a sprain or ruptured muscle [17]. Pain may be out of proportion to physical findings in the initial hours. Over the next several hours to days, the local pain may diminish due to nerve damage [18].

Soon, however, the patient will display systemic septic signs, like high grade fever, hypotension and tachycardia, and tend to appear moderately to severely toxic [19,20].

On local examination, the initial sign is erythema and warmth that quickly spreads. There is tenderness and edema that extends beyond the erythematous border. The edema often has a tense quality, making the skin feel hardened. As infection progresses, skin vesicles, ecchymosis, and dysesthesia/paresthesia appear over the affected area. Subcutaneous emphysema and crepitus are only present in the gas-producing type of necrotizing fasciitis, and their absence does not rule out the disease [19,20]

Treatment

These patients are extremely ill and should be transferred immediately to the intensive care unit. The sepsis causes refractory hypotension and diffuse capillary leak. Thus the patient will need aggressive resuscitation with fluids and the use of inotropes to maintain blood pressure. The patient must be kept NPO (nothing by mouth) until seen by the surgeon. Nutrition is vital, but only after surgery has been completed. Enteral feedings should be started as soon as the patient is hemodynamically stable. The enteral feedings may help offset the massive negative protein balance that occurs as a result of catabolism.[21,22]

Key concepts for treatment/management of skin and soft-tissue infections are:

1. Early diagnosis and differentiation between necrotizing and non-necrotizing soft tissue infection.

2. The early launch of appropriate antibacterial coverage (broad-spectrum)

3. Adequate control of infection sources, such as aggressive surgical intervention for abscess drainage and debridement of necrotizing soft tissue infections.

4. Identification of infection-causing pathogens and applicable adjustment of antimicrobial coverage.

Points to be considered in IM Injection Technique

- Before preparing for the procedure, it is necessary to verify, by enclosed package, the necessity or not of massage, the properties of the medicine and usage. For medications which do not require massage, it is important to communicate this information to the patient.
- Moreover, when carrying out repeated IM injections, the previously employed injection site and administered volume should be verified from the patient record, and the opposite side or alternate site selected for use.
- When utilizing the gluteal IM injection sites, patient position at administration will differ depending on the site. Prone position is necessary for the four and three-way split method point. Furthermore, it is important to verify the absence of swelling, redness and induration by palpation, as well as feelings of pain or discomfort by the patient.
- As a rule, direction of the needle should be at 90 degrees to the skin in order to ensure the entire tip reaches the appropriate area. When carrying out IM injections, the syringe should be held in the dominant hand, piercing perpendicular to the skin, using the pen-holding method as a means of keeping it steady.
- Before injecting the medicine, it is crucial to verify with the patient that there is no numbness or severe pain. Pull back slightly on the plunger to check the absence of blood, if there is blood, withdraw the needle and stop the bleeding.
- When injecting the medicine, do not change hands, keep the syringe steady so as not to alter the direction or depth of the needle, use the opposite hand to deliver the medicine.
- To avoid risk factors such as nerve and blood vessel damage, and injecting a site different from that assessed, physicians and nurses should sit on a chair or something to administer the injection.
- Physicians and nurses should always wear gloves to comply with standard precautions against infection.

Discussion

Necrotizing fasciitis is the most serious complication associated with intra muscular injection administration. The skin normally acts as a protective barrier against bacteria accessing the body but is breached when a injection (needle) is inserted. [Necrotizing fasciitis is typically an acute process that evolves very rapidly over a few days. In approximately 80% of all cases, it is a direct consequence of a disruption of skin's integrity followed by bacterial infection. The disease occurs when the right set of conditions are present; in approximately 80% of all cases, these include a disruption of skin's integrity that allows bacterial infection, such as surgical wounds, animal bites, lacerations, scratches, burns, minor invasive procedures (joint aspiration, acupuncture), intramuscular injection, and folliculitis [23]. Necrotizing Fasciitis is observed particularly in cases with comorbidities and risk factors include diabetes, chronic disease, immunosuppression, malnutrition, advanced age, non steroidal anti-inflammatory drug (NSAID) use, morbid obesity, liver cirrhosis, intravenous drug mis-use, alcoholism, peripheral vascular disease, chronic renal failure, immunological disorders, HIV–AIDS, paraplegia, underlying malignancy and varicella infection [24,25,26].

Early and aggressive surgical debridement of necrotic tissue is the cornerstone of management. It reduces the infection burden, minimizes ultimate tissue loss, reduces the need for amputation and thereby, decreases mortality [27]. Debridement should be extensive and all the necrotic and poorly perfused tissues that can be easily elevated off the fascia with gentle pressure should be excised .

Skin grafts find application in diverse clinical situations such as traumatic injuries, post-resection defects, burn reconstruction, scar release, and vitiligo, among others. [28] Skin grafting is a procedure that is essential to reconstructive surgery for patients who have suffered burns, traumas, and non-healing or large wounds. This skill is necessary to provide improved quality of life for patients with significant wounds and extensive burns. Split-thickness skin graft (STSG) refers to a type of widely used skin graft that comprises both the full layer of the epidermis and a part of the dermis. The STSG can be meshed and the meshed type is mainly used to treat big burn or trauma. General STSG, a convenient and effective method that is typically used for skin defects and wound healing.

Conclusion

1) It is essential to deliver the drug accurately into the muscle in order to achieve adequate drug efficacy and prevent injection site reactions from IM injections. Therefore, when delivering an IM injection of a drug without an attached specialist needle to the buttocks, a suitable injection needle between 23G 25 mm to 21G or 22G 38 mm, must be chosen depending on physique and particular drug characteristics.
2) Before preparing for the procedure, it is necessary to verify, by enclosed package pamphlet and interview form, the necessity or not of massage, the properties of the medicine, meticulous, and usage. For medications which do not require massage, it is important to communicate this information to the patient for the purpose of ensuring optimum drug efficacy. Moreover, when carrying out repeated IM injections, the previously employed injection site and administered volume should be verified from the patient record, and the opposite side or alternate site selected for use.
3) Careful planning, preparation, and postoperative care are necessary for skin grafting, which can be a difficult process. A number of variables, including the type of graft used, appropriate wound care, general patient health, and coexisting conditions, might affect the outcome of the transplant. Skin grafts have changed dramatically over the years due to improvements in wound care, bioengineered materials, and surgical methods. They are still a vital component of wound healing

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