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Compressed Air Injury of Upper Limb

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Abstract:

Injuries due to compressed air are very rare.We present a case of compressed air injury due to industrial accident in which no pre-existing skin injury was present. This injury required prompt surgical intervention and was managed successfully with minor surgical decompression without any complication or permanent disability.

Key words: Compressed Air, Surgical Decompression, Accidents, Musculoskeletal Diseases.

Introduction

High pressure injection injuries of hand are well known industrial accidents due to widespread use of paint and grease guns, diesel engine injectors, and hydraulic pumps. However, injuries due to compressed air are uncommon. They are usually caused by injection of compressed air into pre-existing minor skin lesion when compressed air is used to remove dirt or foreign body from skin or skin wound [1,2]. We present a case of injection of compressed air into subcutaneous and intermuscular spaces of upper limb in absence of pre-existing skin breach.

Case Report

While working on a PVC extrusion machine, a needle [Fig.1] used for expansion of PVC film accidently fell on dorsum of left hand of a 40 year old male worker resulting in a skin breach. Since high pressure injection machine was on, it injected compressed air at 20 atmospheric (Atm) pressure into subcutaneous tissues of hand. The patient experienced severe pain and swelling of left upper limb followed by numbness of all the fingers. Examination revealed punctured wound on dorsum of left swollen hand with dusky fingers [Fig.2]. Painful restricted finger movements were observed due to swelling with no neurological deficit. All peripheral pulses were palpable. Crepitus was present on skin of left upper extremity up to axilla due to surgical emphysema. X-rays and MRI of left upper limb revealed air in subcutaneous space and muscle planes of forearm.

Patient was given injection pethidine to control severe pain and taken to operation theatre. Multiple cuts were given on skin of hand, forearm and arm and trapped air was released by manual pressure. His pain

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Fig.1: Needle used for blowing compressed air into PVC.

Fig.2: Puncture wound on dorsum of hand at entry point of needle.

and swelling was partially relieved. However, post-operative X-rays showed persistence of air under the skin and intermuscular spaces. Swelling of upper limb persisted for 15 days while it took 6 weeks for numbness to disappear completely. Patient recovered full function of involved upper limb in 6 weeks.

Discussion

Extensive search of literature has yielded less than 20 cases of injection injuries of hand due to compressed air. In contrast to high pressure injection injuries involving paint, diesel, and water etc., compressed air injection injuries usually follow benign course [3]. These injuries usually occur in non-dominant hand. As stated earlier, compressed air enters subcutaneous tissues when air hose comes in contact with minor skin injury of hand. Probably ours is the first case where compressed air entered body tissues through a wide bore needle piercing skin like an injection. Most of reported high pressure air injection injuries have responded to conservative treatment. However, compressed air can cause soft tissue damage. Although, air is not toxic, tissues can be damaged by kinetic energy of air or by dust particles in air. Jansen and Holm have advised exploration under tourniquet and if necessary decompression and debridement [4]. Whenever such injuries are managed conservatively, hand should be inspected regularly for development of complications [5,6,7]. Early mobilization of fingers without splinting helps in faster functional recovery of hand.

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