CASE REPORT

Compartment syndrome caused by suction

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Introduction

Although injuries due to vacuum suction have been previously reported, to date there have been no case reports in the English literature describing compartment syndrome as a complication of such an injury. A case is described of a patient who presented to the Emergency Department with a suction injury of the forearm. This rapidly developed a compartment syndrome which required urgent treatment.

Case report

A 38-year-old machine operator, presented having had his right arm forcibly sucked into an industrial vacuum cleaner. The machine, which operates at a suction pressure of 50 kPa has a hose with an end diameter of 18 cm. The hose formed a complete seal around the patient’s upper arm and the enclosed limb was subjected to significant suction for approximately 40 s.

At presentation, he was complaining of pain in the flexor compartment of the arm, exacerbated by passive extension of all the fingers. He also complained of paraesthesia in the palmar aspect of the ring, middle and index fingers. On examination, the forearm was tense and the flexor compartment exquisitely tender to palpation. The skin appeared pale with widespread petechiae (Figure 1), particularly on the flexor aspect. The extensor compartment was pale, but without severe pain on palpation. The radial pulse was easily palpable. Subjective sensory testing was normal throughout apart from a slight deficiency in the perception of pinprick in the palmar aspect of the fingers. Radiology of the radius, ulna and hand was normal.

The absolute measured pressure in the flexor compartment of the forearm (using the Stryker intra-compartmental pressure monitor, Kalamazoo, USA) was 55 mmHg, compared with 5 mmHg in the normal right forearm. With a diastolic blood pressure of 80 mmHg, this corresponded to a "ΔP" value of 25 mmHg. A diagnosis of compartment syndrome was made and the patient taken to theatre where long fasciotomies were carried out in the extensor and flexor compartments of the forearm both superficially and deep. At operation, the forearm flexor muscle bellies were deep purple/black in appearance and clearly displayed evidence of severe ischaemia.

The patient made an excellent recovery and now has full function of the entire arm. Indeed, he has been able to return to his job which involves heavy manual work. In particular, he has normal
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power in the forearm flexors and no continuing paraesthesiae.

Discussion

Compartment syndrome is caused by raised tissue pressure causing ischaemia within a closed muscle compartment. Although usually caused by internal injury such as bleeding, post traumatic swelling, tissue trauma and surgery, a similar syndrome can be produced by tight dressings and plaster casts.

The most accurate method of diagnosing compartment syndrome is by the use of the intra-compartmental pressure monitor such as the one used in this case. It has been suggested by various authors that an absolute tissue pressure between 30 and 45 mmHg is a threshold for decompression although in 1996 McQueen and Court-Brown showed that absolute pressures were unreliable and recommended the use of the differential pressure ($\Delta P$). This is the difference between the diastolic blood pressure and the tissue pressure and they recommend that decompression should be performed if $\Delta P$ falls to less than 30 mmHg.

The case described here was unusual in that it had been caused by indirect trauma from suction. Initially, the only clinical features leading to the correct diagnosis were the presence of small petechiae on the skin along with disproportionate pain on light palpation.

Because there is only a very short period for safe observation in these cases, it is important that this diagnosis be considered early and fasciotomy performed promptly.

References


Figure 1 Photograph of the volar aspect of the left forearm showing widespread petechiae.