BILATERAL OEDEMA OF LEGS AND ANKLES FOLLOWING FIXATION OF CHEST FOR FRACTURED RIBS

REPORT ON TWO CASES

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The following two cases appear to be of rather unusual interest in that oedema of the feet and legs developed after fixation of the chest wall for fractured ribs.

The patient, a man aged 63, was referred from the orthopaedic clinic with a history of having slipped in his home and hit the corner of a table with his chest. He came to hospital the same day complaining of tenderness over the anterior end of the right and the left third rib, with pain on deep inspiration. Fracture of both third ribs was diagnosed and confirmed by radiograph, the fractures being one and a half inches from the anterior end. Adhesive strapping was applied to the whole circumference of the chest. The patient attended regularly for observation. Three weeks later he complained of swelling of both ankles. At this stage he was referred to us with the history and complaint already stated. His previous medical history was entirely negative. The patient was of good physique, somewhat pale, but not anaemic or dyspnoeic. He was strapped round the whole circumference of the chest, from the third rib downwards, by four pieces of strapping which overlapped each other.

On examination he was seen to have oedema of both legs and feet with marked pitting on pressure. He had no varicose veins. The temperature was normal, the pulse rate 72, and the blood pressure 120/80. The urine was acid, with no albumin or sugar. The heart revealed a maximal impulse in the fifth space half an inch within the nipple line and well localized. No murmurs were heard and no enlargement of the heart was detected. The chest was completely clear, and without crepitations at the base. There were no signs of free fluid in the abdomen, and no enlargement of the spleen, liver, or of the glands anywhere. The central nervous system was normal.

The strapping was removed, and a week later the patient attended again at the medical out-patient clinic. He reported that the swelling had disappeared two days after removal of the strapping. On examination the oedema of the legs and ankles had completely gone, and had not reappeared when the patient was seen again two weeks later.

We are prompted to report the above case by the fact that five months ago we had an exactly similar one.

A man aged 50 was strapped for fractured ribs. After wearing his strapping for a month he was referred from the orthopaedic department with oedema of the legs. The findings again, apart from the oedema, were completely negative: normal pulse rate, normal blood pressure, no abnormal cardiac signs, no previous history of swelling anywhere, no abnormal cardiac or renal history, no varicose veins, no enlarged glands, no albuminuria.

In this earlier case the oedema also disappeared forty-eight hours after removal of the strapping. The patient attended again after a week and after a fortnight, and the oedema had not recurred.

Discussion

It is difficult to correlate these two cases with any of the usual causes of oedema. In the first place there was no previous history of cardiovascular or renal disease or

of angioneurosis, and no clinical signs pointing to any of these diseases, except the oedema; secondly, the oedema was a true oedema; thirdly, the patient was ambulatory the whole time; and, lastly, the oedema disappeared dramatically after removal of the strapping in both cases, with no recurrence.

Many of the diseases outlined by French (*Index of Differential Diagnosis*) are examples of intrathoracic diseases, whose production of oedema is not surprising. Is it possible that an extrathoracic cause like strapping can also give rise to the same phenomenon?

It is interesting to recall that Samson Wright in his *Applied Physiology* (1937), discussing the venous return, states (page 353):

"With each inspiration there is an increased negative pressure in the pleural cavity which aspirates blood towards the heart." (Cf. page 430 quoted below.) "The diaphragm descends, raises the intra-abdominal pressure, and so squeezes blood out of the splanchnic veins."

On page 430, discussing intrapleural pressure, he says:

"The intrapleural space is very small in the living adult, as the visceral and parietal layers of the pleura are practically in contact. The pressure in the pleural cavity is sub-atmospheric, and is -5 mm. Hg (that is, 5 mm. less than atmospheric) during expiration and -10 mm. Hg during inspiration. The pressure in the lungs is about one atmosphere, as they are in free communication with the outside air. The full intrapulmonary pressure is not transmitted to the pleural cavity, however, owing to the elastic recoil of the lungs. The more the lungs are stretched the greater is their tendency to recoil. Consequently the more the lungs are distended by a deep inspiration the more subatmospheric (that is, more negative) does the pressure in the pleural cavity become."

"As previously pointed out" (continues Samson Wright—page 353, quoted above), "the negative intrapleural pressure aids the venous return to the chest. If the chest wall is widely opened air enters the pleural cavity and the lungs collapse."

Can it be possible that a condition such as strapping, which prevents deep inspiration or, shall we say, makes deep inspiration more difficult than usual, after a time causes embarrassment of the venous return?

This condition seems to be very unusual, since a careful search of the literature up to date has revealed no reference to it.

Summary

Two cases of bilateral oedema of the legs and ankles are reported following strapping of the chest wall, and disappearing after removal of the strapping.

Can fixation of the chest wall, by interfering with deep inspiration, ultimately result in embarrassment of venous return?

Our thanks are due to Mr. E. S. Brentnall, honorary orthopaedic surgeon, Ancoats Hospital, for referring these cases and for allowing us to make use of his records.

R. M. Buchanan (*J. Hyg.*, 1940, **40**, 605) records his observations on fifty cases of cerebrospinal meningitis in the Sudan, which, he says, does not differ from the disease as observed in more temperate climates. It presents no racial peculiarity in response to infection or to chemotherapy. There is no sex or age peculiarity in incidence, both sexes and all ages responding to chemotherapy. Buchanan has found that sulphapyridine is superior to sulphanilamide in the shortening of invalidism and prevention of complications. In most cases oral administration is as effective as intramuscular. The initial dose is 2.5 grammes for adults and 1 to 1.5 grammes for children, with subsequent graduation of treatment. The course need not be prolonged beyond seven days.