90% of patients, with a relapse rate of 57% in the first year; a reduction in the average number of relapses was recorded in 15 cases kept on a maintenance dose for one year. The mode of action of the tablets and the possibility of toxic symptoms arising are discussed.

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THE TREATMENT OF SIMPLE RIB FRACTURES

A CRITICISM OF A "LAISSEZ-FAIRE" POLICY

BY

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The treatment of simple rib fractures appears to have remained unchanged for many years, and has commanded no great attention among recent surgical writings in this country. Strapping, binding the chest, or some other form of support remains the sheet anchor in therapy as recommended by the majority of writers. This article draws attention to the frequency with which these fractures occur, and advocates a better method of initial treatment; it is concerned only with simple uncomplicated rib fractures, and not with crush injuries of the chest.

About 80 cases of simple rib fractures are seen every year in this unit, and it is calculated that about 15,000 occur every year in Great Britain. This represents a formidable mass of suffering and disability, sufficient to justify far more care and attention than this problem usually receives.

Most medical students in this country seem to be taught to use some form of strapping as the main and usually the only method of treatment, while 33 out of 40 British and American surgical textbooks which have been consulted make similar recommendations.

A Criticism of Strapping

As a method of treatment for these fractures I believe strapping of any type has several major disadvantages.

1. *It is an Inefficient and Inadequate Method.*—I do not believe it is ever possible to immobilize a rib fracture completely except by internal fixation, which indeed is advocated by certain American writers for this very reason. Strapping provides inadequate support, only partial immobilization, and fails to stop the acute pain suffered with every full inspiration, attack of coughing, or energetic movement. One of the pressing worries to the patient is inability to sleep with any degree of comfort, a complaint of which hardly any mention is ever made in standard textbooks. I have seen patients bound in strapping who still cannot sleep at all adequately or comfortably two or three weeks after the injury. A method of treatment which fails to ensure a good night's rest two or three weeks after the injury should be discarded.

2. *It is an Uncomfortable Method.*—Nearly every patient from whom I have removed previously applied strapping has been profoundly relieved to be rid of it. Many find it extremely irritating, and a high proportion develop skin rashes under the strapping, even in a few days. This point, too, is glossed over in most textbooks.

3. *It is a Lazy Method.*—Undoubtedly many doctors apply the strapping themselves; quite certainly, many delegate it usually to one of the nursing staff. To give an order is in this case less trouble than to carry it out.

4. *It may even be a Dangerous Method.*—Hirsh and Ellis (1940) record the cases of two patients who developed bilateral oedema of the legs and ankles following fixation of the chest for rib fractures. While this must be a rare occurrence, it is yet a warning of what can happen.

Injection as a Primary Treatment

Zoppi (1936) was apparently the first to advocate local analgesic injection, using procaine. Strong support for this came from Hamon *et al.* (1942), and Smith (1942) drew attention to two distinct causes of pain: (1) the dull ache of muscle and ligamentous injury, and (2) the sharp stabs of bone pain. Other writers in favour are Homans (1945), Bancroft and Murray (1945), Ferguson (1947), Naylor (1952), and Belsey (1953). Roualle (1952) suggested using "efocaine" as a long-acting analgesic, while Winkler (1951) used a long-acting analgesic in treatment by means of intercostal nerve blocks. Yet, despite this not inconsiderable body of evidence in favour of injection treatment as a primary procedure, what Belsey calls the "time-honoured treatment by strapping" remains the predominantly taught and, I believe, practised treatment in this country. In my opinion it is a method honoured by nothing but time.

Smith's paper first brought injection treatment to my notice some years after its publication; he pointed out that, although in theory one injection of a short-acting analgesic such as procaine should last for only a few hours, in practice it often sufficed to relieve bone pain not only completely but permanently. For a number of years I treated these fractures by direct injection into the fracture site of 1-2 ml. of 2% procaine with no external support whatever, and was satisfied that Smith's claims were fully justified. More recently a long-acting local analgesic was substituted, using a benzocaine-urethane solution as advocated by Rutter (1952).

During the early months of this year efocaine was used for direct injection to each fracture site, but although no untoward sequelae have occurred the use of efocaine has now been abandoned in favour of the benzocaine-urethane solution in view of the serious complications reported by Clarke *et al.* (1955) and Parsonage *et al.* (1955).

I believe injection is the treatment of choice in almost every patient; it abolishes bone pain completely and it can be easily repeated if necessary. Injection takes no longer than does the application of strapping, there is no interference with the patients' bathing, and they can sleep in comfort.

The symptoms and signs of these fractures are adequately described in textbooks and need not be reiterated here, but the most important and valuable finding does not normally receive adequate emphasis. This is extreme local tenderness at the fracture site. Smith stressed this years ago, and I am convinced it is of fundamental importance. The patient who is thoroughly bruised but without a fracture does not have this extreme local tenderness; in those with a fracture one can accurately locate the fracture site(s) in a few moments.

Use of Radiographs in Rib Fractures

It is commonly advised that every suspected rib fracture should be radiographed, and it is often admitted that only 50% of these fractures are seen on the x-ray plates. I believe the true figure is much smaller and that too much importance is placed on x-ray films in uncomplicated rib fractures, despite their supposed importance from the

medico-legal viewpoint. At least 50% of cases which give adequate clinical evidence of fracture(s) are liable to be classified as "no fracture seen." The x-ray pictures are virtually of no help in defining accurately the site(s) of fracture for injection purposes. The basic principle that patients should be treated on clinical grounds and not on x-ray findings is just as true with rib fractures as elsewhere in medicine and surgery. A patient with a history of injury to the chest; acute pain made worse by coughing, deep breathing, and forced movements; a positive compression test; and, of most importance, acute local tenderness over one or more ribs should be treated as having rib fractures whether or not the x-ray films show any positive evidence of this. Were it not for the medico-legal aspects, and perhaps even despite these, I believe that most chest x-ray examinations for suspected rib fractures are a waste of time and money as well as uncomfortably delaying the one treatment which can really relieve the patient's pain. If there is any suspected complication, such as a concomitant lung injury, then, of course, x-ray examination is imperative.

Technique of Injection Treatment

The patient is stripped to the waist and lies on the unaffected side on a couch with the arm of the affected side stretched above the head; this arm position makes identification of the fracture site(s) considerably easier. When the patient has pointed to the painful area, this is examined by most careful palpation and one or more points of extreme local tenderness are found. A skin mark at each site is then made; here a ball-point pen is useful. If the fracture is lateral the patient remains in the lateral position, if more posterior he is placed in a more prone position, and if more anterior a more supine position is adopted. After cleansing the skin a subcutaneous weal is raised with 1% procaine and through this another needle is inserted directly down to the bone, which is quite easily felt. Then 2 ml. of benzocaine-urethane solution is injected at this level, and the skin puncture is covered by a touch of collodion. Each fracture is treated by a separate injection. No supportive strapping or bandages are subsequently applied.

Illustrative Cases

Several patients treated in the past three months have not been seen until two, three, or even four weeks after the injury, having previously been treated by strapping. Most of them, however, have been given the benefit of local injection, even at this late stage, and none have failed to show considerable symptomatic improvement. But, in order to be most effective, the injection should be given as soon as possible after injury; at a later stage organization of the haematoma at the fracture site may limit the penetrating power of the local analgesic.

A man of 71 was admitted after a road accident in which he sustained fractures of the right clavicle, right seventh and eighth ribs, right fifth metacarpal, and right tibia (double, comminuted). When first seen his main complaint was of acute pain in the right side of the chest. His rib fractures were injected within five hours of the injury, with immediate benefit. An hour later he complained for the first time of pain in the right leg, which at that time was still in a temporary box splint. His rib pain was so dominant that until it was abolished he was not conscious of acute pain from his tibial fractures.

A woman of 54, seen twenty days after fracturing her eighth left rib, had been routinely strapped. She still had pain on coughing and still slept badly. Injection entirely relieved her pain; she did not trouble to keep her next appointment, and was not seen again until asked to attend two months later; one injection had relieved her cough pain and enabled her to sleep properly again, even though it was not given until nearly three weeks after the injury.

A man of 60 fractured his right fifth to eighth ribs and was seen on the eighth day. His strapping was removed and each fracture site was injected. At that time coughing and deep breathing were painful and he was off work. He failed to return until sent for, when he admitted that his relief from injection had been immediate and permanent, and that within five days of injection he had been at work lifting 88-lb. (40-kg.) cheeses.

A woman of 40, six months pregnant, was seen fourteen days after a severe bout of coughing had produced acute pain in the left side of the chest. She was forced to sleep propped up on several pillows, and had obviously sustained a cough fracture. Injection relieved her pain and she was able again to sleep in a normal position. Birch (1954) recommends strapping for cough fractures in pregnancy. Injection gives a far better result.

A woman of 79 had had a series of operations on her right hip-joint, following a femoral neck fracture. While at home a severe fit of coughing produced acute pain in the right side of the chest. She was treated for strained muscles. Three weeks later, attending with regard to her hip-joint arthroplasty, she had pain on coughing, deep breathing, and forced movements, and was diagnosed as suffering from cough fracture of the right tenth rib. Injection produced immediate pain relief.

Injection Treatment and the General Practitioner

A frequent sequence of events following rib injury is for the patients to consult their own doctor and be referred then to hospital for x-ray examination for ? rib fracture. Two, three, or four x-ray pictures are taken and strapping is applied, usually in the casualty department. If the patients are elderly they may require admission. Those of working age are often off work for a month or more. Meanwhile the dismal sequence of painful days, sleepless nights, and a chest wall irritating under constricting strapping is their lot. Complaints of overcrowded out-patient departments and of hospitals undertaking an undue proportion of the treatment of many conditions are frequently encountered. Here is one condition in which the hospitals could hand back the patient's treatment to the general practitioner. Why should he (or she) not undertake primary injection of the rib fracture with a long-acting analgesic, and then, and only then, refer the patient for x-ray examination if such be considered necessary on medico-legal grounds? This would save the patient much unnecessary pain and delay and facilitate a much earlier return to work or household duties, the x-ray department would be spared in many cases, and for some patients it would avoid the necessity of hospital admission.

Medical students should be taught injection treatment as a routine procedure. Any concern regarding dangers due to lack of practice could be avoided by trial runs in the dissecting or post-mortem rooms.

Summary and Conclusions

Many thousands of patients sustain simple rib fractures every year in this country. Most of them appear to be treated by some form of strapping, which does not abolish their bone pain; they lose weeks of working time and often cannot sleep properly for long after the injury. Strapping as a method of treatment is outmoded and should be abolished in almost every case and replaced by the injection at each fracture site of a long-acting analgesic. Many of these injections could be given by the patient's own doctor, thus avoiding visits to hospital. X-ray films are of doubtful value and serve little purpose in most cases of simple rib fractures.

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