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ON THE CAUSES AND TREATMENT OF DELAYED UNION IN FRACTURES.

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During a railway accident on the 3rd of February, several years ago, Mr. C., aged thirty-two, sustained fracture of the humerus in its upper and lower third. The patient was promptly attended to by two surgeons of acknowledged ability, who, after a brief period, duly put the limb up in splints. At the end of eight weeks a fair amount of union had taken place in the fracture near the elbow, but none whatever in that of the superior third of the bone. A starch bandage was now applied for some weeks, but without benefit. The surgeons now deemed it necessary to scrape and puncture, subcutaneously, the ends of the bone with a tenotomy knife. This not answering expectations, a seton was passed between the ends of the bone. About five months after the accident Mr. C. came under my care, wearing the seton, which I allowed to remain for a time, trusting it would finally produce sufficient local action. In this, however, I was disappointed, and at length determined to try the time-honoured plan of friction. To accomplish this, a weight of sixteen pounds was attached to the hand and wrist of the lame arm, which had the effect of bringing down the lower fragment into apposition with the lower end of the superior. On every second or third day for a fortnight, gentle swinging of the weight was used each time for about fifteen minutes, or until some uneasiness was produced. This mode of treatment was continued, gradually increasing the force of the friction, for four or five weeks longer. For the last three weeks an operation every fourth or fifth day was deemed sufficient. The arm had now become somewhat swollen and painful, with

just sufficient increased vascular action to hold out more promising results. A long, heavy, hollow, box splint, fitting the back and sides of the limb, was now applied, extending from the shoulder to the hand, the whole allowed to hang unsupported, so that the weight of apparatus, fore-arm and hand might keep up sufficient extension for the adjustment of the upper and lower fragments. The arm was left undisturbed in this splint for six weeks. On removing it, we were gratified to find the stubborn fracture had firmly united, and the patient shortly afterwards returned to active employment on the railroad, where he worked steadily for just thirty days, when he was again overtaken by misfortune. On going home from his work in the darkness of the evening, he unluckily fell into a cow-catcher and broke the middle third of the same unfortunate bone, nearly three inches below the old fracture of the upper third. But little trouble was experienced by this last affair, as, under the ordinary treatment, firm union took place in forty-five days, and again the patient resumed his duties on the road, and still remains there, a much esteemed employee of the same company.

Notwithstanding the amount of satisfaction experienced on the termination of cases similar to the above, yet nothing can be more vexatious to the surgeon than the occurrence of delayed union, in any case of fracture entrusted to his care. The limb may have been quite properly put up, and from time to time sufficiently examined without unnecessary disturbance; in every way treated secundem artem; the patient in apparent good health; the case, in fact, promising recovery in the usual period allotted for cure. The dressings are removed: the parts present a fair appearance as to position; ends of fragments apparently in apposition; the contour of the limb symmetrical; but, on handling it motion is discovered, and, to the dismay of the surgeon, he finds that he has an ununited fracture, and that to deal with. Such an unlooked for result may occur to the most skillful practitioner, and that indeed without any obvious pre-existing condition to render him apprehensive of non-union. In most systems of surgery, many, possibly too many, causes are assigned for the failure of ossific deposit, and the long list of causes is followed by one still longer of remedies, or plans of treatment. Considerable experience has led me to believe that the causes of deficient deposit are