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THE SILVER WIRE IN UNUNITED FRACTURE, WITH A CASE.

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In a late number of this journal (July, 1859) I reported the history of a case of "ununited fracture of the radius and ulna successfully treated by drilling and wiring," the case having previously resisted the means ordinarily used by surgeons to procure union, including simple drilling and the seton.

Since the publication of the above case I have made further trial of the wire, in a case of false joint of three years' standing, and the result goes far to confirm the opinion there expressed, that the operation, both in safety and certainty, was superior to the operations generally practised in such cases.

The necessity of freely exposing the ends of the fragments, and of dissecting away ligamentous connections or coverings, in order to insert the wire satisfactorily, makes the operation appear somewhat formidable, in comparison with the so-called milder methods, as the introduction of the seton, drilling, acupuncture, &c. But it has appeared in the three cases in which I have performed the operation, that both the local and constitutional disturbance was very much less than that produced by the seton in the same cases. For in each case in which I have introduced the wire, the *seton* and the operation of *drilling* had been unsuccessfully tried—the seton especially being followed by erysipelatous inflammation of a dangerous character in one case, and long-continued suppuration in another. The testimony of my patients is conclusive to the fact, that *wiring* is less severe than the seton. And it will be noticed in the report of the case below given, that the seton had been worn thirteen weeks, occasioning at times severe suffering, from inflammation and abscess; while, in the operation by the wire, the external wound was healed and the union of the fracture quite firm in

forty-two days, and the inflammatory symptoms were altogether of a trivial character.

Wiring, as I have performed the operation, is in fact the application of the "silver suture" on a large scale to fractured bones; and it will be quite evident to any one familiar with the action of metallic sutures in the soft tissues, that they fulfil quite closely the conditions required for the union of unrepaired fracture, which are immovable, and close coaptation of the fracture ends of the broken bone, for a considerable length of time, associated with a *continued and gentle stimulus to the vessels of the bone and periosteum at the point of fracture.* It is also essential, for the speedy and perfect progress of the reparative action in the bone, that the surrounding soft tissues should be free from the higher stages of inflammation. According to my observations, if the wire is properly inserted, and is allowed to remain undisturbed, the bone in a few days becomes passive to the presence of the foreign body; while the wound in the soft tissues closes up around the projecting wire almost as speedily as in a simple cut. Even under considerable tension, produced by daily tightening the "loop," the separation of the wire in my cases has been a slow process—not being accomplished under twenty or thirty days.

Case.—L. T., Enfield, N. H., 33 years old, married, and healthy—*ununited fracture* of the lower third of the right humerus. According to the patient's account the accident occurred in 1856, or about three years since. The fracture was received while at work with a threshing-machine, and was compound.

The case was under the care of a skilful surgeon, but without any apparent reason the bones failed to unite.

Seven months after the accident the patient went before the clinic of Dartmouth Medical College, where the operation of *drilling* (after Brainerd's method) was performed.

Getting no benefit from this operation, the patient, six weeks afterwards, went to Boston, where he placed himself under the care of Dr. Warren, in the Massachusetts General Hospital. Here a seton was introduced, which was retained thirteen weeks. The irritation produced by the seton was severe, and at last suppuration was so extensive and the pain so great that it was removed.

This operation was also unsuccessful, and in view of the failures, and the fact that the patient while young had suffered from *necrosis* of several of the bones of the lower extremities, an unfavourable prognosis was given, and the young man returned to his home.

Since that time nothing has been done in the case. At the present time (June, 1859) the limb presents the usual features of confirmed false joint. The arm is nearly useless, and is carried in a sling. The upper arm is very much shrunken, and somewhat scarred by operations and abscesses. The

ends of the fragments can be freely felt, and they slip by each other to the extent of an inch and a half, in any attempt to move the limb.

The forearm is well developed, and in some positions, when a leather bracelet is worn about the fracture, the hand is useful. The general health of the patient is perfectly good.

Seeing nothing in the present condition or previous history of the case that could interfere with the success of the wiring operation, I suggested the plan, and on the 16th June the operation was performed in presence of numerous medical gentlemen of this town and neighbourhood.

Operation.—The patient being fully etherized, an incision about five inches in length was made over the fracture, on the outside of the arm, extending down to the bone. The ends of the fragments were found to be inclosed in a strong capsular ligament, which, on being opened, discharged about half an ounce of clear synovial fluid, having about the consistence and appearance of lamp-oil. This capsular envelop was dissected away, and the ends of the bones fully disclosed. This capsule was interspersed with numerous small osseous scales, which made it somewhat difficult to cut; and at the point where the membrane was attached to the bone were numerous rough projecting bony points, and ridges which probably marked the sites of the *drill-holes* formerly made. The end of each fragment was covered with smooth cartilage—the upper fragment exhibiting a sort of shallow cavity on its broken end, in which played the rounded end of the lower fragment, after the manner of a ball-and-socket joint. The cartilaginous covering was dissected from the ends of the bones, and the surfaces deeply scarified with the bone-forceps. From the lower fragment a projecting spike of bone was also removed. With a common small sized gimlet several holes were then bored obliquely through each fragment. The instrument entering on the periosteal surface about an inch from the extremity, and coming out at the end.

Through one set of these holes was then inserted a stout wire (made by twisting together four strands of the largest silver wire as used by Simms), the extremities of which being twisted by strong clasp forceps, brought the ends tightly together in the loop, with the wire projecting from the wound.

The external wound was then brought loosely together by adhesive plaster, and the limb laid into a right-angle gutter splint, made of tin for the purpose, and extending from the axilla to the fingers. Water-dressing was applied over the wound.

June 17. Saw the patient at 9 A.M.; complains of some pain in the arm and shoulder. Some heat and swelling in the neighbourhood of the wound. Passed rather a restless night, although he took half a grain of morphia in the evening. Pulse, 105. Added infusion of opium to water-dressing, and prescribed rigid diet, mucilaginous drinks, and morphia—p. r. n.

18*th*. General febrile symptoms abated. Patient comfortable. Changed dressings. Arm considerably swollen; but wound looking well. Treatment continued.

28*th*. The case has progressed favourably. The wound is now discharging freely about the wire, and is closing at the extremities. The swelling in the limb generally has much diminished, though a prominent ridge has been thrown out at the part embraced in the wire-loop. The wire having become somewhat loose, it is twisted as much as the patient can easily bear.

July 25. To-day, while tightening the wire, it became detached, and was removed with the loop unbroken. The external wound has closed, excepting at the point where the wire projected. A well-formed callus seems to embrace the fracture, and the arm can be lifted from the splint without displacement, though the connection is yielding.

August 6. Since the last record, two or three small bits of bone have been discharged from the wound. Swelling has nearly disappeared, and the wound has closed, excepting a mere point. The prominent callus is also disappearing, though the consolidation is now so great that the bone will sustain the weight of the forearm without bending. Removed the splint and applied a *gum* and *chalk* bandage from the hand to the axilla, cutting a small aperture in the bandage opposite the wound for the purpose of dressing, &c.

8*th*. Having ascertained that the stiff bandage is well borne, dismissed the patient, with directions to begin to use the hand after two weeks, and to wear the bandage as long as it fitted closely, or the arm needed support.

The present condition of the limb will be seen by the following extract from a letter, dated December 7th, from Dr. B. F. Skinner, his attending physician :—

"I examined T.'s arm day before yesterday. It is evidently firmly united. He has worked constantly with a one-horse team for two months or more, drawing wood, gravel, goods from the depot, &c. He says the arm feels as strong as the other. I am unable to see why the cure is not complete."

RUTLAND, VT., January 7, 1860.