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OPERATIVE TREATMENT OF CLOSED FRACTURES OF THE PATELLA.

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The choice of the methods of treatment of fractured patella and their efficiency is dependent upon several principles, important among which must be recognized the fact that this bone on its under surface is in close apposition to the synovial membrane forming the joint cavity proper, and that a fracture of this bone on its under surface means almost certainly a solution of continuity of this membrane. We cannot ignore the result, acute traumatic synovitis, either from the standpoint of its late influence on the function of the joint or of the immediate lowered resistance and susceptibility to infection in the event that operative procedures are determined upon. It is unnecessary here to lay stress upon the fact that many of the fractures of the patella are due to indirect muscular action, and that we are confronted most frequently with a closed fracture. The fractures, however, may be transverse, comminuted, or in the event of direct violence, open.

Again, of importance is the fibrous, fascial membrane which covers the upper surface of the patella, and extends out on either side, protecting the lining membrane of the joint. This frequently suffers the fate of the underlying membrane, and is torn either along the line of fracture or irregularly, so that its edges may become interposed between the bone fragments and thus prevent bony union. We see a vary-

ing amount of blood between the fragments and into the joint cavity itself, and frequently also, small bits of chipped bone, either loose or attached by fibrous shreds to the larger fragments.

The lining membrane and the overlying fibrous layer may be torn laterally in both directions a moderate distance from the bone fragments. These conditions, then, may be those with which we must deal in such fractures. Our efforts must be to avoid the sequelae of the traumatic synovitis; to bring into apposition the separate fragments and to hold them until firm union has taken place, and, finally, we must prevent joint adhesions from forming in order that we may obtain as an end result a perfectly functioning joint.

In considering the procedures to be used, we may resort to the closed, or to the open, or operative methods. In both cases the associated synovitis may be similarly treated. Application of gentle pressure bandages; fixation of the joint in extension; and daily application of massage in the region of the joint associated with the free use of the Paquelin cautery is of extreme importance in promoting the absorption of the intra-articular fluid, and bringing the membrane and surrounding tissue to a more normal state. This will, in a certain percentage of cases, obviate the prolonged stiffness and pain in the knee joint which occasionally persists for months or even years. It is usual to allow from three to ten days before operating under this regime for the subsidence of the more acute symptoms.

In the open fractures there is necessarily no doubt as to the procedures to be followed, and a discussion as to those methods applicable to open joint injuries is out of place here. The treatment of the patella and fascial covering is very similar to that which is applied to the operative treatment of closed fractures which will be described below.

In the comminuted fractures there may be an element of doubt as to the courses to pursue, for the small fragment with little displacement would hardly call for the application of

X-RAYS OF PERSONAL CASES OF FRACTURED PATELLAE.

It is to be noted that the double loop of wire was used in all instances excepting that represented by the eighth photograph. Here, the transverse fragment is so small that the single loop resulted in exact apposition. (Note—The long, irregularly placed wires are merely the skin sutures, and have nothing to do with the loops used in the apposition of bony fragments.) Number seven represents a comminuted fracture, which is seen after operation in the tenth photograph. The first six photographs represent transverse fractures before and after wiring. Number five and number nine show transverse fractures with marked separation of the fragments.

operative procedures unless this should be a transverse fracture of one or the other ends of the bone.

Where several or more fragments exist, judgment must be exercised as to the necessity of operation. Should they be similar, functionally speaking, to a transverse fracture, we are of the opinion that similar reasoning must be applied in contemplating mechanical interference. In transverse fractures the fragments may be separated by larger or smaller distances and either the closed or open methods may be considered. The former briefly stated amounts to extension of the leg; fixation of the joint; drawing the upper fragment downwards by inward and downward pressure of an external strap, and in a similar manner pulling the lower fragment upwards so that the fractured surfaces are in angular apposition one with the other, clean apposition being finally obtained by placing a pressure strap immediately over the line of fracture. We cannot determine by these means whether a screen of fascia is interposed between the fragments, and we are unable to remove extraneous matter such as bits of bone, blood clot, etc., from the joint cavity, which may lead to irritation and adhesions causing finally limitation of motion and pain. The time consumed under this treatment is, it is safe to say, almost twice as great as that consumed under the operative treatment, approximately two or more months longer. The strongest point in favor of this treatment would seem to be its adaptability to elderly people or in those with lung and heart complications where an anaesthetic is contra-indicated. The union in such cases is frequently fibrous rather than bony, and the fragments will often separate, leaving a broad fibrous band joining the fragments.

In the open method, we have two contraindications, the anaesthetic, and the possibility of infection of the joint following the operation. With the diminished resistance, none but the most perfect surgical technic may be used, yet under such conditions we look with more favor upon the operative treatment. By this

means we may irrigate the knee joint carefully and remove blood clots, bone fragments and material which might, after organization, lead to serious functional disturbances in the joint itself. We may bring and retain the fragments in exact apposition, removing interposing fascia if necessary, and we may repair existing tears of the fascia and synovium lateral to the bone fragments, and thus turn conditions more directly towards the normal state.

The steps used are as follows: (1) A semi-circular transverse incision through the skin and between the separated fragments; (2) careful irrigation and cleansing of the joint cavity; (3) the removal of any interposing layers of fascia between the fractured surfaces of the patella; (4) the exact apposition by two loops of silver wire through holes drilled at an angle through the fragments so that the silver wire does not enter the joint; (5) the careful suture of the fascial layer, both where it overlies the patella and laterally, if the tears have extended thus; (6) the application of a few fine silk stitches in the superficial fascia; and finally (7) the closure of the skin by subcutaneous silver wire. This latter is removed in the course of eight or ten days, and the outward appearance of the field of operation remains merely as a fine almost invisible transverse line. With the application of a light plaster cast we are able to let the patient be up at this time, though it is not until about the third week that it is best to start passive motion. The patient at this time may be up and around with a slight fixation bandage and several weeks later this may be discarded for some mild support which itself may be discarded a few weeks later, when we may consider that the joint is functioning normally, and that bony union is perfect. In the cases which are treated by the closed method we are unable to proceed as readily in the removal of the mechanical aids and necessarily the patient is confined much closer, and it is probably safe to say that whereas in the operative cases we may consider our treatment as finished in two to three months, the

closed method requires attention for a longer time, and we dare not consider the joint normal until five or six months have elapsed. Concerning the after effects, there is, as a rule, little trouble if we are careful in our toilet of the joint. Perhaps a few adhesions but not very persistent may occur. It seems logical to believe that the more attention we pay to the acute complication of this condition in its earlier stages the better will be our final result. In the series of seven cases upon which we have operated (see illustrations)—two women and five men—we have had practically no after effects except some slight stiffness and pain in the convalescence, suggesting the mild results of an acute serous synovitis of traumatic origin. In none have we experienced the slightest infection, and the functional end results have been excellent.

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SPLENECTOMY IN PERNICIOUS ANEMIA.

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We probably know less about the function of the spleen than any other organ in the body. Splenectomized individuals when they survive the operation become quite normal after several months, as far as the loss of this organ is concerned. There is some possibility that the red bone marrow or lymph nodes are able to take up its function under these circumstances.

Richet believes that in addition to the hemopoietic (blood forming) and hemolytic (blood destroying) roles of the spleen, that it is capable by some unknown mechanism of facilitating the utilization and consummation of foods. He compared nine splenectomized dogs with nine normal dogs as similar, in age, size, disposition, sex, etc., as it was possible to get them. The dogs from whom the spleen had

been removed ate more but fattened less than the normal animals.

Bayer thinks that the spleen and thymus can be compensating to each other functionally. He tabulates the metabolic findings in two cases of Banti's diseases before operation with those two months, six months and two years after removal of spleen. His data by comparison with other cases confirms the multiple function of the spleen. It wards off hemolysis, stores up iron for the production of new cells and produces a hormone, which has an inhibitory action on the sympathetic nervous system.

R. M. Pearce shows that healthy dogs develop anemia for several weeks after removal of the spleen, with a return to a normal blood count in about five month's time, whether given an excess of iron in their diet or not. He denies Asher's claim that iron is eliminated in increased amounts after splenectomy. He advocates splenectomy in pernicious anemia only if there exists some splenomegaly (enlargement), and where the blood shows young regenerative forms, nucleated reds and reticulation. This demonstrates according to Vogel and McCurdy the ability of the red bone marrow to form new red blood corpuscles.

H. Eppinger reports ten cases of removal of the spleen. Two for hemolytic jaundice, three for Banti's diseases, two for cirrhosis of the liver, one for catarrhal jaundice (almost like acute yellow atrophy), and two for pernicious anemia, with very good results. He says that increased amount of urobilin in the urine indicates the blood-destroying action of the spleen.

Klemperer and Hirshfeld removed the spleen in two cases of pernicious anemia with excellent results.

Von Mosse reports one case. He advises that the hemolytic resisting power of the blood be tested first with salt solution, its own serum and other serums.

Other cases have been reported by Turk, Von Decastello, Port, Harpole & Fox, Coleman & Hartwell, Moffitt and Minot.