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BY  
FREDERIC S. DENNIS, M.D., NEW YORK,  
*Professor Principles and Practice of Surgery, Bellevue Hospital  
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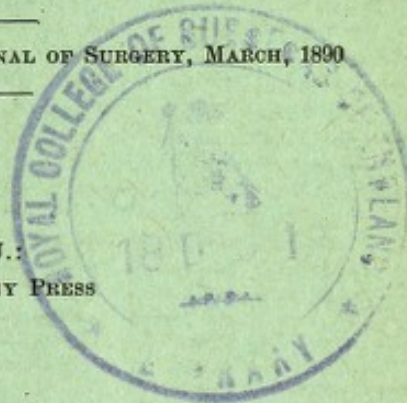
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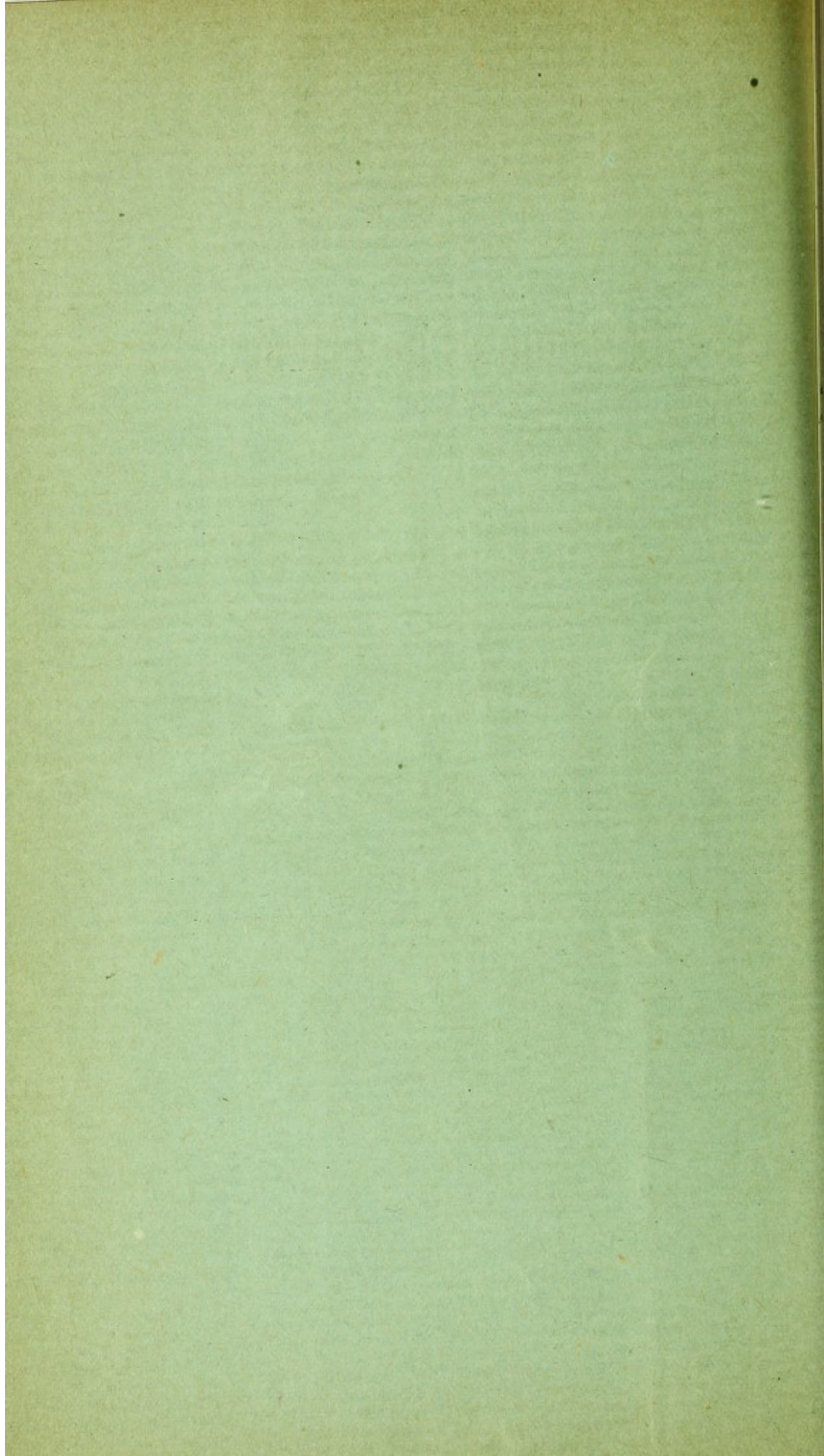
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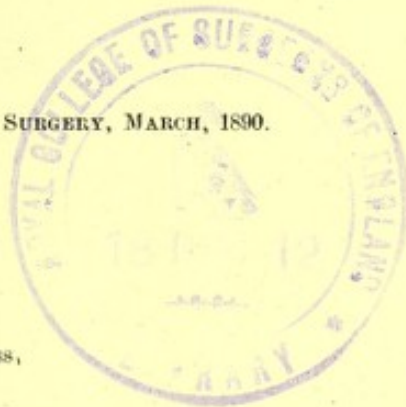
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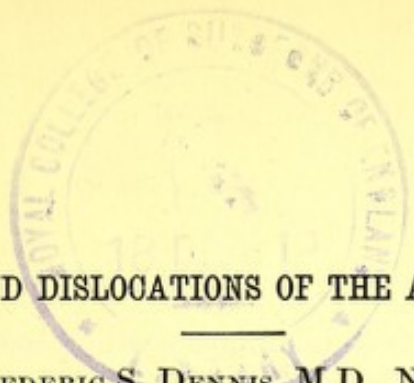
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CONTROLLED DISSEMINATION





## COMPOUND DISLOCATIONS OF THE ANKLE-JOINT.

BY FREDERIC S. DENNIS, M.D., NEW YORK,

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BEFORE the days of antiseptic surgery compound dislocation of the ankle-joint was considered a most serious injury. Even in these days, at a time when the technique of aseptic surgery is nearly perfect, the management of these cases is often attended with unsatisfactory results. The mortality in past years was very great, and blood poison was a cause of death in these severe joint cases. At the present day this cause of death has been practically removed; but the question as to the adoption of the best means of restoring the perfect function of the ankle-joint is one that engages the earnest attention of surgeons.

It has been my privilege during the past few years, as attending surgeon in three large metropolitan hospitals, to have had a large number of cases of compound dislocations of the ankle-joint, and it is the object of the present paper to describe fully the treatment which I believe will be followed by the most gratifying results.

There are seven Procrustean rules, the strict observance of which has given to the writer most satisfactory results, first as regards the life of the patient, and second as regards the complete function of the joint.

*First.* Immediate asepsis of the entire limb.

*Second.* Thorough irrigation of the ankle-joint.

*Third.* Free drainage entirely through and across the ankle-joint.

*Fourth.* Perfect immobility with plaster of Paris.

*Fifth.* Removal of the drainage tube on the third day, with final irrigation and closure of the drainage openings.

*Sixth.* The employment of gentle passive movements and massage at the end of the third week.

*Seventh.* The free use of the joint without crutches or cane at the end of the sixth week.

These seven rules, taken together and practiced in their proper sequence, have afforded me results in the treatment of these injuries that have been perfectly satisfactory. The patients have been, during the repair of the injury, free from fever, from pain, from suppuration; and they have recovered with perfect restoration of the joint. Any result other than one attended with no constitutional disturbance and with complete restoration of the joint may be called unsatisfactory. The adoption of one or several of these rules will not yield a good result. Their adoption from the beginning to the end in the order mentioned is necessary to secure an ideal result. I have watched the reports of cases in journals and find that many do well until the third day, and that the careless dressing on that day was the cause of abscess, of necrosis, and general joint disease. Again I have read of cases where an employment of active motion too early in the history of the injury resulted in chronic disease of the joint. I have seen cases treated by surgeons where neglect in rendering aseptic the limb has been the cause of serious trouble. If the rules mentioned should be adopted in their entirety, and in the chronological order mentioned, I feel certain that the results will be uniform, satisfactory, and brilliant.

It is the continuity of the plan I believe to be most



important. Perfect asepsis at the start will not yield brilliant results unless faithful and conscientious attention is paid to the subsequent details. Each rule must be observed in proper sequence, in order to obtain at the end of the treatment an ideal result.

I. *Immediate Asepsis of the Entire Limb.*—Too much importance cannot be placed upon this first rule. The knee-joint, the entire leg, and the foot should immediately be thoroughly washed with an abundance of soap and warm water, protecting at the same time with iodoform gauze the opening into the joint during this ablution. The leg should be cleanly shaved with a razor and again washed, after which the parts should be freely irrigated with a 1-500 solution of bichloride of mercury. A saturated solution of iodoform in ether should be poured over all the extremity. The limb and foot should now be protected with towels wrung out in a bichloride solution 1-2000. Having removed the wet towels placed under the leg during the aseptic cleansing of the limb, and having substituted clean bichloride towels, attention is next directed to the joint itself.

II. *Thorough Irrigation of the Ankle-Joint.*—An irrigator suspended a few feet above and filled with a hot 1-5000 bichloride solution should now be used. The nozzle of the syringe should be introduced into the joint and all the blood-clots washed out, together with débris that may have entered the joint. A strong director should be passed through the joint until its blunt end is felt at a point opposite, and then it should be cut down upon and the wound made large enough to admit a large-sized drainage tube.

Surgeons have been accustomed to drain the ankle



joint upon one side, and introduce the tube at the opening made at the site of the injury. This is inadequate and insufficient. A pocket upon the opposite side of the joint is formed, into which blood serum, lymph, and synovia collect, and thus a nidus is formed for infection. Unless the joint is thoroughly irrigated in all its parts there is danger of abscess. If a study of compound dislocation of the ankle-joint is made, the interesting fact is observed that abscesses are subsequently formed upon the side of the joint directly opposite to the original opening. The time of formation of these abscesses, their situation and character, point to the fact that their development is due to sepsis originating within the joint. The curious clinical fact that some time after the original injury to the joint an abscess forms upon the opposite side, and where the tissues are all sound and uninjured, suggests at once that the abscess is due to sepsis and caused by the retention of septic material in the pocket of the joint distant from the original wound. By free and perfect drainage, and by antiseptic irrigation at the time of the first dressing, and by providing a free outlet upon the healthy side of the joint no retention of blood, or lymph, or synovia can take place, and wherever such perfect drainage is established the abscess is prevented. The abscess that forms under these circumstances is prolific of evil. It sets up free suppuration in the joint, and this is followed by necrosis, and then resection or amputation must be performed as a *dernier ressort* to save the patient's life.

The *fourth* rule to adopt in the management of these cases is the immediate fixation by plaster of Paris. Perfect immobility is essential, and this can



be best secured by the employment of the plaster of Paris bandage. The wound having been covered by iodoform gauze, and pieces of wet bichloride gauze having been placed loosely over the wound and upon the foot and leg, a wet antiseptic bandage should be applied to keep the loose dressing in place. Over this a combined dressing, or layers of purified cotton should be rolled and a bandage to keep the dressing in place. A piece of sheet iron about one inch in breadth, and bent at the heel so as to extend from the toe down the plantar surface of the foot over the heel and up on the posterior surface of the leg, reaching above the knee-joint, should be adjusted. A corresponding strip of sheet iron bent to fit the dorsum of the foot, the front of the ankle, and the anterior surface of the leg, should next be applied. Two short lateral splints of the same material should be placed on either side. The plaster of Paris bandage can now be rolled over the splints, and a light plaster bandage applied, which now possesses great strength on account of the splints ; but which is not heavy or cumbersome. At the first dressing a fenestrum can be cut over the wounds, in order to withdraw the drainage tube. The leg can be suspended by a Salter's swing, which will enable the patient to move about in all directions in bed during the repair of the wound. If there is any difficulty in placing the foot and limb in proper position, the tendo Achilles can be divided, and thus physiological rest is at once enforced.

The *fifth* rule is one to which a strict adherence should be given ; but a slight margin should be allowed as regards the exact time of the removal of the drainage tubes. If the wound was small and



there has been little laceration, the third day is the most appropriate time for the entire removal of the drainage tube. If, however, there is an excess of discharge from it, the tube can be allowed to remain until the following day. At this dressing on the third day, if it is thought best, for the reasons given, not to remove the tube, then it should be irrigated, the nozzle of the syringe being introduced into one end of the tube, and a weak bichloride solution passed through it and through the joint, and the drainage made once more free.

It sometimes happens that after the joint has been irrigated, the tube can be divided into two parts and a short end inserted into each of the bilateral wounds, and these left in until the following day. If the tubes remain longer than three or four days, they excite irritation in the joint and may set up suppuration. Again, the rubber tubes become softened in three days, and are likely to tear apart owing to the tension produced by withdrawing them through tissues to which they have become agglutinated by inflammatory adhesion. Finally, after three days the tubes, having accomplished the object for which they were employed, should be removed, because they are not intended to drain pus, but to carry off the products of acute inflammation arising from the traumatism to the joint.

The *sixth* rule, which relates to passive movements and massage at the end of the third week, is an important one to observe. Any movement of the joint prior to this date is attended with danger. The parts are not ready for passive motion before three weeks, and an attempt to move the joint prior to that time will excite a new inflammation which may lead to sup-

uration. If the joint is not moved at this time, the adhesions become firm, and ankylosis is certain to follow, and consequently the function of the joint is destroyed. Shampooing and gentle friction are also valuable adjuvants at this period in the history of the injury. It is to be especially noted that the movement allowed to the joint is not active, but passive, and the former should not be permitted until six weeks from the date of the accident. The rule that Sir James Paget has given is here especially applicable. He taught that an acutely inflamed joint with heat and tenderness in it should be kept physiologically at rest, and that a joint that was stiff and partially ankylosed, but that was free from all inflammatory action, should be treated by passive motion and by massage.

The *seventh* rule applies to movements in the joint to be made by the patient. Active motion in the joint is necessary at this period to excite the secretion of synovia, to release the tendons from any adhesions due to a thecal inflammation, to disintegrate fibrous adhesions, to restore the natural motion in the joint, to absorb any of the products of inflammation, as collateral œdema and ecchymoses in the surrounding soft structures. It sometimes happens that at this stage swelling occurs in the leg or in the foot from the removal of the plaster bandage. This is, however, only temporary and will soon disappear upon the patient walking about for a few days. If active motion is allowed earlier than the sixth week, there is danger of exciting new and suppurative inflammation in the joint; and a joint that gave every prospect of becoming perfect in function at the end of the second or third or even the fourth week, may become totally



destroyed by a too early employment of motion at a time when absolute rest is imperatively demanded.

No hard and fast rule can be made as to the amount of movement that the patient should be allowed to make. The best guide is the feelings of the patient. Too much exercise is as harmful as too little, and exercise attended with pain and fatigue is as injurious as the movement of the joint a week after the injury. The patient should be advised to move the joint but little at first, and by increasing the amount of movement daily, perfect restoration of the joint can be secured.

I have seen most gratifying results follow this plan of treatment in compound dislocation of the ankle-joint. Recently I have had two cases, in one of which the compound dislocation was associated with a fracture. In both of these cases recovery took place with little or no constitutional disturbance and with perfect restoration of the joint. In another case the astragalus was entirely outside of the joint and held only by a ligament. The astragalus was returned to its proper place, and the patient recovered with but very slight constitutional symptoms and with a perfectly restored ankle-joint. I regret that space will not permit the report in full of these and other cases of compound dislocation of the ankle-joint.

If I have succeeded in directing attention to a plan of treatment that will insure success in the difficult management of these serious injuries the object of the paper is fulfilled.