AN INAUGURAL THESIS ON INTRA-CAPSULAR FRACTURES OF THE CERVIX FEMORIS

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JOHN GEO. JOHNSON

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Inaugural Thesis

ON

INTRA-CAPSULAR FRACTURES

OF THE

CERVIX FEMORIS.

SUBMITTED TO THE PUBLIC EXAMINATION OF THE TRUSTEES AND FACULTY OF MEDICINE OF THE COLLEGE OF PHYSICIANS AND SURGEONS OF THE

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BY JOHN GEO. JOHNSON,

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Intra-Capsular Fractures of the Cervix Femoris.

Until within a few years, much diversity of opinion has existed upon this question. Lately, the preponderance of opinion has inclined strongly toward the affirmative. In the conviction, however, that it is an open question, we desire to submit to the profession the results of our investigation of the subject.

The first question which presents itself is—Can intra-capsular fractures be diagnosed with certainty *during the life* of the patient?

Fractures of the cervix femoris present themselves in three varieties:—1. Those entirely within the capsular ligament. 2. Those entirely without the capsular ligament. 3. Those partly within and partly without the capsular ligament.

The subjective symptoms are:—1. Pain. 2. Loss of voluntary motion. The objective symptoms are:—1. Swelling and deformity at the hip. 2. Approximation of the trochanter major to the anterior superior spinous process of the ilium. 3. Shortening. 4. Crepitus. 5. Eversion. 6. Formation of callus. 7. The direction in which the force is applied.

It is hardly necessary to refer to the first of the subjective symptoms as a means of diagnosis, for in all cases of fracture of the cervix femoris, there is more or less injury to and laceration of the soft parts—and, consequently, pain.

It is generally admitted that in all these cases the patient feels pain in the whole vicinity of the joint.

2. Loss of voluntary motion exists in all fractures of the cervix femoris where there is displacement, whether the fracture is within or without the capsule. The only exception is in cases of impacted fractures, where the shaft of the bone is driven into the cancellated portion of the head, in which cases the power of voluntary motion may still remain.

Of the objective signs, the amount of shortening *immediately* attendant on the injury has been insisted upon as the most conclusive in the diagnosis of intra from extra-capsular fractures.

Those that insist that they can distinguish between these kinds of fractures during the life of the patient, maintain that the amount of immediate shortening in the cases of

extra-capsular fractures is so much greater than in intra-capsular fractures, as to furnish conclusive evidence as to which class the fracture belongs. First, they maintain that immediate shortening is greater in extra-capsular fractures, from physiological principles; second, as a matter of experience. The physiological reason is, that the cervix femoris is surrounded by a capsular ligament, which, in health, is extremely powerful, and closely embraces the head and cervix; thereby preventing the shaft from slipping so far in intra as in extra-capsular fractures. If the capsule was in every case uninjured, this would be satisfactory; for it must be admitted that the capsular ligament is very strong, and acts powerfully in retaining the fractured parts in their places. If, however, the capsular ligament is torn, the shaft of the bone may slip through the rent, and thus afford an amount of shortening as great as in cases of fractures entirely without the capsule. All authorities admit that laceration of the capsule may, and often does, occur. Again, if the head of the femur is comminuted, shortening to an indefinite extent may occur. The head of the femur may be comminuted, as this fracture usually occurs in persons past the prime of life, when all the bones are fragile. Further, we can not diagnosticate oblique intra-capsular from transverse extra-capsular fractures, for it is quite impossible to feel the direction of the fracture, imbedded as it is. Again, the shock is sometimes so great as to cause a paralysis of the muscles, and in these cases the shortening does not immediately occur, even though the fracture be extra-capsular. The fracture may also be impacted, and yet extra-capsular. In these cases there will not be as much immediate shortening, as is claimed for all cases of extra-capsular fractures.

From these considerations, we conclude that unless the condition of the capsule, or the precise nature of the fracture can be determined, the amount of shortening is not a diagnostic mark to be relied on.

2. *Opinion of Authorities.*—It is surprising to find the amount of difference among authorities upon this point. The most eminent surgeons, not of this country alone, but English, Irish, and French, hold directly opposite opinions.

Sir Astley Cooper says, that intra-capsular fractures gives the greatest amount of shortening. Mr. Stanley *is opposed to him.* He states that extra-capsular fractures have the greatest shortening. Amesbury claims the greatest shortening for intra—and Earle, for extra-capsular fractures. Robert

Wm. Smith, of Dublin, claims the greatest shortening for extra-capsular; while Chassaignac, and Vidal, (de Cassis) are opposed to Desault, Boyer, Dupuytren, and Cloquet.

How can these contradictory opinions be reconciled or harmonized? Only by considering that, in some instances, the intra-capsular fractures have given the greatest amount of shortening, and in other instances the extra-capsular fractures give the greatest shortening; and that the surgeons who have seen the cases of the first class, hold the opinion that extra-capsular shortening is the greatest; while those who have seen cases of the second class, hold the opinion that intra-capsular shortening is the greatest; accepting this, as the true explanation, and there is none other we can accept without charging either the one side or the other with ignorance or with intention to mislead, (neither of which charges we are willing to make,) we are compelled to conclude that this symptom does not present itself with sufficient regularity to be of weight as a diagnostic sign. This is the opinion entertained by the French Surgeon, M. Rodet, who says:—"Cette opposition formelle entre les opinions de ces grands chirurgiens vient sans doute de ce qu'il n'y a rien de constant dans le degrè du raccourcissement, qui accompagne de ces deux espicès des fractures." With this difficulty, both in theory and in experience, we are compelled to exclude the amount of shortening as diagnostic of the character of the fracture.

Crepitus.—This will depend on two conditions: first, whether there is anything interposed between the ends of the bone, as muscle, capsular ligament, etc., to prevent the rubbing of the ends together; second, whether there is impaction. If there is no impaction, and nothing interposed between the ends of the bones, there is no reason why crepitus should not occur, whether the fracture is intra or extra-capsular.

Eversion.—This will depend, if the fracture is intra-capsular, much on the amount of laceration of the capsule. If the capsule is lacerated, there is no reason why the foot may not be everted as fully as in cases of extra-capsular fractures. Until it is determined whether there is, or is not, laceration of the capsule, it is certain that we can not make the amount of eversion a diagnostic sign.

Again, if the fracture is extra-capsular and impacted, there may be as little eversion as in cases of intra-capsular fracture, where the capsule is not lacerated. So, whether we

have intra-capsular fracture with laceration of the capsule, or extra-capsular fracture without laceration; whether we have intra-capsular fracture without laceration, or extra-capsular fracture with impaction, we can not form a diagnosis from the eversion.

Callus.—It has been thought that the existence of callus furnished a means of diagnosis, because there would be no callus formed around the ends of the bone, if the fracture was intra-capsular. This is true; there is no callus formed *within* the capsule, but there *is* a *formation* of callus in cases of intra-capsular fracture. The callus is formed precisely where the law that governs plastic exudations would teach us to look for it, viz.: *external* to the capsule, where there are tissues capable of effusing it. It is effused *external* to the capsule precisely *where* it is effused in cases of *extra*-capsular fracture. This fact is beautifully shown in the specimen of intra-capsular fracture, now in the possession of Dr. William H. Van Buren, of this city. A minute description of which will hereafter be given. The simple formation of callus, therefore, can not be considered a diagnostic sign of extra-capsular fracture, as it may be found in the same place in both kinds of fracture.

Approximation of the Trochanter Major to the Anterior Superior Spinous Process of the Ilium.—This can not be a diagnostic sign, for there will be approximation in *every* case of fracture of the cervix, and the degree of approximation will depend on the direction of the fracture; an oblique fracture giving us more approximation than a transverse; and this rule will hold true, whether it is an intra or extra-capsular fracture.

Swelling and Deformity at the Hip.—This will occur in both cases; the amount of deformity depending on the direction of the fracture.

M. Rodet having come to the conclusion, that none of thesa signs were diagnostic, rejected them; and maintained thet *the direction in which the force was applied* was the only diagnostic sign; and that the fracture will be intra or extra-capsular, oblique or transverse, according as the force has been received in a vertical, lateral, or transverse direction. Mr. Smith thus sums it up:

Force acting vertically,.....	Fracture will be	oblique, and intra-capsular.
antero-laterally,....		transverse, and intra-capsular.
postero-laterally,...		mixed.
transversely,.....		extra-capsular.

Thus, if the person fell upon the knees, we should have the first class, oblique and intra-capsular; and in regard to this argument, Mr. Smith, of Dublin, makes the following very just remarks: "With respect to Rodet's diagnostic sign, it will be admitted as a general principal, that the mode of application of the force and the direction in which it acts, will determine the situation and direction of the fracture; but I contend that it is seldom available in practice in determining the seat of a fracture of the neck of the femur with respect to the capsule, for it would be extremely difficult, if not impossible, in the generality of cases, to obtain from patients a description of the direction in which the force was applied, as accurate as would be necessary before we could avail ourselves of it as a means of diagnosis. It is not probable that a person of advanced age, who had just suffered so severe an injury as fracture of the neck of the thigh bone, would be able to inform us whether the shock was sustained by the external surface of the trochanter, or whether there was a deviation anteriorly or posteriorly from a directly lateral fall." (SMITH *on Fractures*, Page 21.) It might be quite impossible to determine the point of injury from an examination of the hip, as it may have been so protected by the clothes, that no ecchymosis occurred, or the contusion and ecchymosis may be so extensive as to lose all value as indications of the precise spot of the application of the force. Mr. Smith also gives an instance (page 21) in which, according to this rule, we should have an extra-capsular fracture, and in which dissection proved that the fracture was intra-capsular. So much for this diagnostic sign, beautiful in theory, but valueless in practice.

I have thus reviewed each of these symptoms of fracture. They are all extremely obscure, and the one upon which the greatest stress has been laid—*shortening*—must be excluded altogether. Taken separately, no one of them will enable us to form a diagnosis; taken collectively, there are so many different conclusions that may justly be deduced from them, that no positive diagnosis can be given between the two kinds of fracture *during the life of the patient.*

If this difficulty attends the diagnosis of the two extreme classes of extra and intra-capsular fractures, still greater difficulty must attend the diagnosis of the third class, which is a mixture of the other two, partly intra and partly extra-capsular; and when we come to diagnose this third class from the other two, it is impossible. As no accurate opinion

can be formed of the precise nature of the injury during the life of the patient, so no conclusion can be drawn as to the osseous or non-osseous union of fractures within the capsule from those patients who recover. This limits the decision of the question to the conclusions derived from an examination of post-mortem specimens.

Before entering on that question, it may not be improper to consider the probability of the osseous union of intra-capsular fractures, in the view of the anatomical and pathological conditions existing. The first point is the effect of the injury on the capsule.

Violence sufficient to fracture the cervix femoris, must be sufficient to cause injury to the synovial membrane of the capsule. The result of that injury will be inflammation of the synovial membrane, and the result of that inflammation will be the effusion of a superabundance of synovial fluid; or, if the inflammation continues long enough, of plastic lymph. Now, when the synovial fluid is poured out, there must be distention of the capsule by it, and if this occurs, then there must be separation of the ends of the bone, for they are attached to the capsule. If the ends of the bone are separated, we can not have osseous union; for even the most ardent advocate of osseous union (R. W. Smith, of Dublin) claims it only in cases of impacted fractures. Now, as long as the inflammatory action continues, so long shall we have synovitis, effusion, distention of the capsule, and consequent separation of the ends of the bone. If the inflammatory action ceases, we shall not have union by bone, for the first thing nature does is to get up an inflammatory action in and around the ends of the bone, whereby plastic exudation is poured out. That we do have synovitis in all cases of intra-capsular fractures is evident from the autopsies, for the capsule is always reported thickened. This thickening is evidently due to inflammation of the synovial membrane, so long continued that not merely synovial fluid had been effused, but plastic lymph, and that lymph had become organized.

2. There is no sufficient means left, after the fracture, to nourish the head of the bone, and furnish material for ossific union. The only possible means of nourishing the head of the bone, are four in number:—1. From the branches of the nutrient artery of the femur. 2. From the periosteum. 3. From the synovial membrane. 4. From the vessels of the ligamentum teres:—1. If the bone