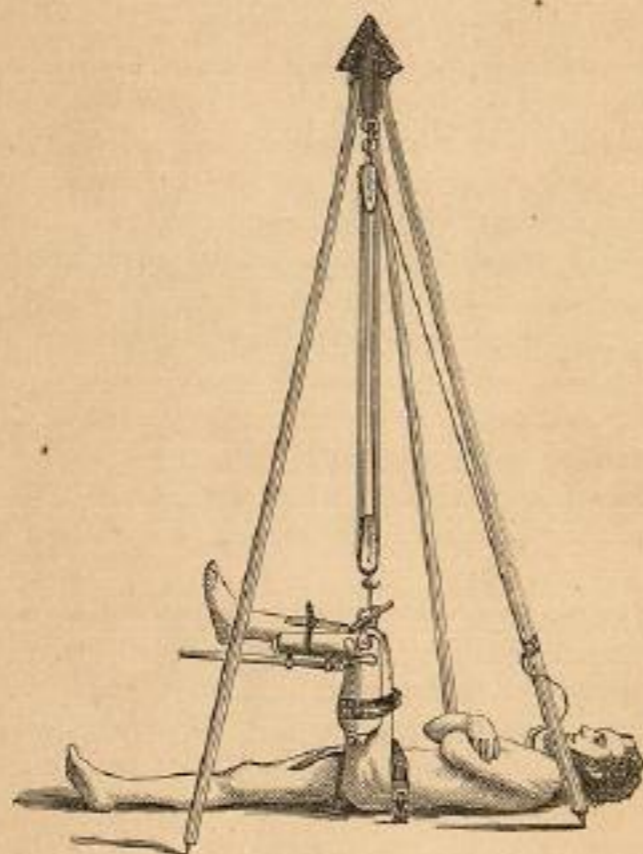


Bigelow's Method of Extension.—The method of extension recommended by Dr. Bigelow, namely, with the thigh at a right angle with the body, has already been referred to; and there is much reason to believe that, as a rule, it is preferable to extension as practised by Sir Astley Cooper. Nearly all surgeons, however, have recognized the necessity of flexing the thigh in certain cases. Dr. Bigelow suggests that where greater force is required than can be obtained by the usual methods, a tripod should be employed, as shown in the accompanying woodcut.

FIG. 336.



Tripod for vertical extension. (Bigelow.)

The following case, reported to me by Dr. N. Fanning, of Catskill, N. Y., illustrates the occasional necessity of resorting to extension, and is of special interest on account of the extreme youth of the patient. I have referred to the same case once before.

A little girl, two and a half years old, was caught under a falling door on the 24th of May, 1867, but her parents suspected no injury beyond a severe bruise until ten days later, when they consulted Dr. Fanning. The left femur was then found to be dislocated upon the dorsum ilii. Dr. Fanning attempted first to reduce the dislocation by manipulation, but he failed. He then directed the father to make extension by the legs, while the mother made counter-extension by seizing the child under the arms, and thus he soon succeeded in effecting the reduction.

§ 2. Dislocations Upwards and Backwards into the Great Ischiatic Notch.

Syn.—"Upwards and backwards into the ischiatic notch;" Sir A. Cooper. "Upwards and backwards into the great sacro-sciatic notch;" Lizars. "Backwards into the sacro-sciatic foramen;" S. Cooper. "Backwards into the ischiatic notch;" Liston, B. Cooper, Miller, Pirrie, Eriksen, Skey, Gibson. "Downwards and outwards on the os ischium;" Boyer, Dorsey. "Backwards and downwards into the ischiatic notch;" Chelius, Petit, Duverney. "Upon the ischium;" Brandi. "Sacro-sciatic;" Gerdy. "Ischiatic;" Malgaigne. "Dorsal below the tendon;" Bigelow.

Boyer considers this dislocation as only secondary upon a dislocation upon the dorsum ilii; but it is very certain that it often occurs as a

FIG. 337.



Dislocation upwards and backwards into the great ischiatic notch. (A. Cooper.)

primary accident. Not unfrequently, also, what was primarily a dislocation into the ischiatic notch, becomes subsequently a dislocation upon the dorsum ilii.

Causes.—A fall upon the foot or knee when the limb is very much in advance of the body; or the fall of a heavy weight upon the back and pelvis when the thigh is nearly or quite at a right angle with the body. Indeed, the causes are very similar to those which produce dislocations upon the dorsum ilii, except

FIG. 338.



Dislocation upwards and backwards, into the great ischiatic notch.

that it is necessary to suppose the limb in a position more nearly at a right angle with the trunk, at the moment at which the force is applied.

Pathological Anatomy.—Mr. Syme, who dissected the body of a man recently dead, whose thigh had been dislocated into the ischiatic notch, found the glutæus maximus nearly torn asunder, the head of the femur being embedded in its substance; the glutæus minimus, the pyriformis, and the gemellus superior lacerated; the capsular ligament extensively torn close to the edge of the acetabulum, and the round ligament completely separated from the femur. The head of the femur was lying in the great ischiatic notch, upon the gemelli and the sacro-sciatic nerve, behind the acetabulum and a little above it; being situated between the upper margin of the notch and the great sacro-sciatic ligaments.¹ Figure 337 is a representation of this specimen.

FIG. 339.



Internal obturator in its natural position. (Bigelow.)

Dr. Joseph C. Hutchison, of Brooklyn, N. Y., has reported an example of this dislocation in which, death having occurred four days after reduction, he was able to ascertain the character of the lesions. By the courtesy of Dr. Hutchison, I was permitted to be present at this autopsy, and the lesions were found to be much the same as in the case related by Syme; but the glutæus minimus was not torn, and there was added a laceration of the obturator externus. Dr. Lente has reported one other dissection made after reduction.²

Dr. Bigelow speaks of a dorsal (upon the ilium) dislocation as some-

¹ Amer. Journ. Med. Sci., vol. xxxii. p. 460.
² Lente, New York Journ. Med., Jan. 1851.

times occupying a position as low as the upper portion of the ischiatic notch; but the dislocation now under consideration he describes as that in which the head of the femur, having been driven from its socket downwards and backwards, is subsequently, in the attempt to straighten the limb, carried upwards behind the socket until it is arrested by the strong tendon of the obturator internus, and the subjacent capsule. This is usually denominated "ischiatic;" but as it is both behind and below the tendon, Bigelow calls it "dorsal below the tendon."

Prof. Gunn makes no mention of the relations of this dislocation to the tendon of the obturator internus, but only speaks of it as a "backward dislocation."

Quain¹ made a careful dissection of a recent ischiatic dislocation, in which no attempt at reduction had been made. The head of the femur rested upon the ischiatic spine, and was separated from the pelvic bones only by the obturator internus and the gemelli. The pyramidalis, situated above the head of the femur, was moderately stretched. The gemelli and obturator internus were greatly stretched; which last-mentioned muscles, with the capsular ligament, alone separated the head from the cotyloid cavity, and from the surface of the innominatum situated behind this cavity. The external obturator and the quadratus were torn transversely. The capsule was detached from the cotyloid margin at its inferior and internal insertions, while its posterior and external portions were intact. The round ligament was torn from its insertion into the head of the femur.

In a case reported by Scott,² the sciatic nerve was compressed between the head and the ischium.

Symptoms.—The position of the limb is in some cases nearly the same as in certain dislocations upon the dorsum. It is shortened usually about half an inch, the thigh being flexed upon the body, adducted, and rotated inwards; but the flexion is often less than in dislocations upon the dorsum, while, on the other hand, it is sometimes much greater. Generally it is such that, when the patient is standing, the end of the great toe of the dislocated limb touches the ball of the great toe of the sound limb.

Bigelow observes that the extreme flexion which is sometimes found to exist, especially when the patient is in the recumbent position, is generally due to the arrest of the head of the femur by the internal obturator and the subjacent untorn capsule. When the patient rises, the weight of the

FIG. 340.



Showing tense condition of anterior half of capsular ligament in "backward" dislocation. (Gunn.)

¹ Quain, Poinset, op. cit., p. 1054.

² Scott, Dublin Hosp. Rep., 1822, vol. 3, p. 389.

limb may force the head up behind the tendon of the obturator; or if the limb is brought down with force, the tendon and capsule may give

FIG. 341.



Internal obturator in its new position. (Ischiatic) "Dorsal below the tendon." (Bigelow.)

FIG. 342.



Dislocation upwards and backwards into great ischiatic notch. "Below the tendon," when the patient is recumbent. (Bigelow.)

what he considers as one of the most important diagnostic marks—indeed, he says it is never absent, nor is it ever met with in any other injury of

¹ Amer. Journ. Med. Sci., vol. xviii. p. 242.

the hip-joint, "whether dislocation, fracture, or bruise;" this is "an arched form of the lumbar part of the spine, which cannot be straightened so long as the thigh is straight, or on a line with the patient's trunk. When the limb is raised or bent upwards upon the pelvis, the back rests flat upon the bed; but so soon as the limb is allowed to descend, the back becomes arched as before."¹ This position, assumed by the back when an attempt is made to straighten and depress the limb, is due to the action of the psoas magnus and iliacus internus. But this can hardly be regarded as absolutely diagnostic, inasmuch as this same phenomenon will be observed in a degree, more or less, in a dislocation upon the dorsum, and in most cases of disease of the hip-joint. The inversion of the toes, immobility of the limb, and the absence of crepitus, are generally sufficient in themselves to distinguish it from a fracture of the neck. Dr. Squires, of Elmira, N. Y., in a note addressed to me in March, 1860, suggests, also, that in ancient cases the projection of the head of the femur may be felt by passing the finger into the rectum or vagina. With my finger in the rectum I determined a dislocation into the ischiatic notch which had existed six months, in a boy twelve years old; and by exploration per vaginam I diagnosticated the same dislocation in a woman at Bellevue Hospital, which had existed four weeks.

Dr. Oscar H. Allis, of Philadelphia, has added another valuable means of diagnosis, namely, that, although the limb, when laid parallel with the other, or as nearly so as it is practicable to place it, and extended, will be found to be only very little shortened, if at all; yet, when the two limbs are brought into a position of flexion, the thighs being at right angles with the body, the dislocated limb will appear one or two inches shorter than the other—that is, the knee of the dislocated limb will be on a much lower level than the other.²

Dr. W. Dawson, of Cincinnati, whose observations in relation to this new sign extended back as far as 1871, and who had repeated the observation several times, published his experience in 1878, without being aware that Dr. Allis had already called the attention of the profession to this point.³

Prognosis.—I have seen two dislocations of this character which were not recognized by the surgeons at the time of the receipt of the injury, nor for some weeks afterwards. One was in a lad twelve years old, who was brought to me from an adjacent county in August, 1847. The accident had happened eight weeks before. His limb was shortened one inch; it was also forcibly adducted and rotated inwards. Dr. Colegrove, a very excellent surgeon, had made a thorough attempt to reduce the dislocation with pulleys a few days before he was brought to me, and I did not deem it advisable to subject him again to the trial. Notwithstanding the dislocation, his limb was quite useful. The second was in the case of the boy seen by Dr. Sayre and myself, to which I have just referred.

¹ Amer. Journ. Med. Sci., Oct. 1843, p. 461, from Lond. and Edinb. Month. Journ., July, 1843.

² Allis, Phila. Med. Times, March 28, 1874.

³ Dawson, Archives of Clinical Surg., Jan. 1, 1878. Hosp. Gaz., May 16, 1878.

Treatment.—In employing *manipulation*, we may follow, with only a slight modification, the directions already given in dislocations upon the dorsum ilii. We find the head of the femur lower; consequently the extent of the circuit to be described in the manoeuvre is diminished, but in other respects the processes are identical.

We must not forget, however, that there is especial danger, while attempting to reduce this dislocation by manipulation, that the head of the bone will be thrown across into the foramen thyroideum. I have already mentioned one case occurring under the care of Dr. Post in the New York Hospital, in which the head of the femur, originally in the ischiatic notch, passed backwards and forwards between the ischiatic notch and the foramen thyroideum many times, and which, although the reduction was finally accomplished, was followed by morbus coxarius. Parker mentions a second case in the same paper,¹ in which his first attempt to reduce by manipulation carried the head of the bone into the foramen thyroideum; but the second attempt was successful. In Dr. Hutchison's case, to which I have already referred, the first attempt at reduction was made without an anæsthetic, and by manipulation after the method described by Reid. The first two attempts failed, and in the third, the limb being more abducted than before, the head of the bone was thrown into the foramen thyroideum. By reversing the movements, it was replaced in the ischiatic notch; and this change of position was made seven or eight times. The patient was now etherized, and the bone was lifted into its socket in the same manner which I have described in the case of Caswell. Malgaigne refers to a patient of Lenoir's, and to another of his own, in which the head of the bone was lodged under the margin of the acetabulum during the attempts at reduction.²

On the 23d of March, 1855, Charles McCormick, æt. 21, a laborer on the "State Line Railroad," was caught between two cars, with his back resting against one car, and his right knee against the other, the right thigh being raised to a right angle with his body. As the cars came together he felt a "cracking" at his hip-joint, and found himself immediately unable to walk or stand.

Two hours after the accident, assisted by my son Theodore, and Austin Flint, Jr., I examined the limb carefully, and made arrangements for the reduction with the pulleys, in case the attempt by manipulation should fail.

The patient lying upon his back, I seized the right leg and thigh with my hands, the leg being moderately flexed upon the thigh, and carried the knee slowly up toward the belly, until it had approached within twelve or fifteen inches, when, noticing a slight resistance to farther progress in this direction, I carried the knee across the body outwards, until I again encountered a slight resistance, and immediately I began to allow the limb to descend. At this moment a sudden slip or snap occurred near the joint, and I supposed reduction was accomplished; but on bringing the limb down completely, I found it was still in the ischiatic notch. I think the head had slipped off from the lower lip of the acetabulum, after having been gradually lifted upon it.

¹ Markoe's paper, N. Y. Journ. of Med., Jan. 1855.

² Malgaigne, op. cit., tom. ii. p. 839.

Without delay I commenced to repeat the manipulation, and in precisely the same manner. Again, at the same point, when the limb was just beginning to descend, a much more distinct sensation of slipping was felt, and on dropping the limb it was found to be in place and in form, with all its mobility completely restored.

No anæsthetic was employed, and no person supported the body or interfered in any way to assist in the reduction. No outcry was made by the patient, yet he informed me that the manipulation hurt him considerably. The amount of force employed by myself was just sufficient to lift the limb, and the time occupied in the whole procedure was only a few seconds.

After the reduction he remained upon his back, in bed, eleven days, in pursuance of my instructions. At the end of this time he began to walk about, but was unable to resume work until after eight weeks or more. It is probable that he could have walked immediately after the reduction, without much if any inconvenience, so trivial was the inflammation which resulted from the accident. He never complained of pain, but only of a slight soreness back of the trochanter major, near the head of the bone. This soreness continued several weeks, and was especially present when he bent forwards. After the lapse of four months, when I last saw him, he occasionally felt a pain at this point in stooping, but the motions of the joint were free; he walked rapidly and without halt.

Perhaps in most cases, and especially when the head of the bone has not been carried by consecutive displacement upwards until it rests fairly upon the lower portion of the dorsum ilii, the most important step in the manoeuvre is to lift the bone toward the socket, by placing the arm under the knee (the patient resting upon his back) and drawing directly upwards.

Prof. Gunn, describing his method, says: An assistant fixes the pelvis while the surgeon flexes the thigh at a right angle with the trunk, and the leg upon the thigh; he then adducts, rotates inwardly, and draws the limb forwards in the direction of extreme adduction, thus lifting the head directly into the socket. Essentially Prof. Bigelow adopts the same method.

If the reduction is attempted by *extension*, we ought to remember that the head of the bone lies more behind than above the socket, and that it is not requisite to carry it downwards so much as forwards; and especially that it must mount over the most elevated margin of the socket, in order to resume its position. The extension ought, therefore, to be made at a right angle with the body, as the following case will illustrate:

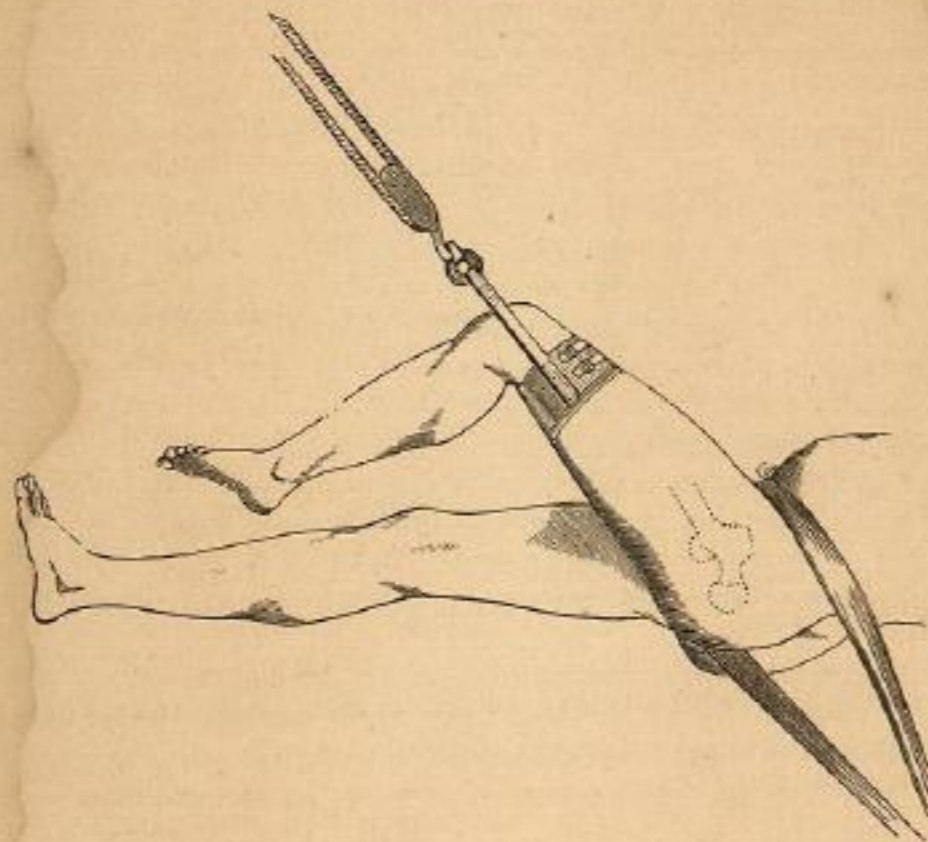
John Hebden, æt. 40, was sitting with his legs hanging over the dock, when his left knee was struck by a ferry-boat, dislocating the head of the femur into the ischiatic notch. I found him at Bellevue Hospital on the following morning, about twenty hours after the accident, September 29, 1866. In the recumbent posture the limb was pretty strongly adducted and slightly rotated inwards. It was shortened three-quarters of an inch. In the erect posture both adduction and inward rotation were very slight.

Having etherized him, I made three separate attempts at reduction by

manipulation, but failed. I then made extension in the following manner: The patient resting upon his back, I stood astride his body, and clasping my hands under the knee, I pulled directly upwards, while an assistant held down the pelvis. I did not feel the bone resume its place, nor was I aware that reduction was accomplished, but when I let the limb down the bone was found to be in its socket.

Two or three minutes later, and before the patient had recovered from the effects of the ether, I raised the knee, to indicate to some young men, who had just come in, how the dislocation had been reduced,

FIG. 343.



Reduction of dislocation upwards and backwards into the great ischiatic notch, by extension.
(Sir Astley Cooper's Method.)

when it slipped out again, with a sudden jerk and a grating sensation. This sensation I had felt once or twice before while manipulating. It was scarcely as rough as the crepitus of a fracture, and it probably indicated that the cartilaginous margin of the acetabulum had been broken off.

The limb was now brought down to the bed, and it was found to be in the same position as before reduction was attempted. Standing again over the patient, and placing my hands under the knee, I pulled upwards, and the head resumed its place; this time with a sudden jerk and with the same rough sensation. The limb was then placed in the extended position and secured by a long splint, which was not removed until the eleventh day.

The facility with which the redislocation took place in the preceding

case will sufficiently explain what happened in the following case on the tenth day after reduction, and on account of which I was subsequently consulted:

William Milne, *æt.* 18, of Orleans County, N. Y., was thrown from a wagon May 13, 1858, dislocating his left femur into the ischiatic notch. Dr. Watson, of Clarendon, Orleans County, was consulted within three hours. Drs. Wood and Tafft were also present. Dr. Watson laid the patient on his back, and without anaesthetics reduced the dislocation by manipulation. The bone was felt distinctly as it slipped into its place, and the limb immediately resumed its natural position and length, as all the surgeons present affirm. He was soon out of the house on crutches, and on the eleventh day went in bathing. When he came out of the water he complained of his hip, and on the following day it was seen to be shortened. Subsequently it was examined by several surgeons, all of whom pronounced it dislocated. An attempt was then made to reduce the dislocation by Jarvis's adjuster, but without anaesthesia, as the patient refused to be rendered insensible. The attempt did not succeed, and the father brought an action against Dr. Watson in the Supreme Court of Orleans County, Judge Noah Davis presiding, for September, 1858. The prosecutor failed to appear, and Dr. Watson, the defendant, took judgment by default.

Lente relates a case in which, extension being employed, the cord was suddenly cut while the limb was abducted and rotated outwards, when the head of the femur left the ischiatic notch, and rose upon the dorsum ilii, assuming a position directly above the acetabulum, and below the anterior superior spinous process; and from which position it was subsequently, with great difficulty, returned to the socket.¹

§ 3. Dislocations Downwards and Forwards into the Foramen Thyroideum.

Syn.—"Downwards into the foramen ovale;" Sir A. Cooper. "Downwards into the obturator foramen;" Lizars. "Downwards and forwards into the foramen obturatorium;" B. Cooper. "Inwards and downwards into the oval hole;" Chelius. "Downwards and forwards into the foramen ovale;" Pirrie. "Downwards and inwards;" Boyer. "Subpubic;" Gerdy. "Ischio-pubic;" Malgaigne.

Causes.—In order to produce this dislocation the limb must be, at the moment of the receipt of the injury, in a position of abduction. Perhaps most often it is occasioned by the fall of a heavy weight upon the back of the pelvis when the body is bent and the thighs spread asunder.

Pathological Anatomy.—The capsule gives away upon the inner side especially; the round ligament is torn from its attachment, and the head of the femur, pressing forwards and downwards, finds a lodgement upon or against the obturator externus muscle, over the foramen thyroideum.

Symptoms.—The thigh is apparently lengthened from one to two inches, abducted and flexed, the body being also bent forwards or flexed upon the thigh. The dislocated limb is advanced before the other, and the toes generally point directly forwards, but they may incline either

Lente, New York Journ. Med., November, 1850, p. 314.

outwards or inwards. The hip is flattened or depressed; the long adductors are felt tense upon the inside of the limb; the trochanter major is less prominent than upon the opposite side; and the head of the bone may sometimes be felt in its new position. The apparent lengthening of the limb alone is sufficient to distinguish this accident from a fracture of the neck.

FIG. 344



Relations of the ilio-femoral ligament to the thyroid dislocation. (From Bigelow.)

I have said "apparent" lengthening, because in the position in which the limb is found, it is difficult to make an accurate relative measurement of the two limbs; and, indeed, Rivington,¹ of the London Hospital, could not in a case seen by him recognize any shortening, and in his experiments upon the cadaver he obtained a similar result. Holmes,² also, in

¹ Rivington, *The Lancet*, 1878, vol. ii. p. 321.
² Holmes, *Med. Times and Gaz.*, Oct. 27, 1877.

FIG. 345.



Dislocation downwards and forwards into the foramen thyroideum.

a clinical lecture has stated that the lengthening is less marked in proportion as the abduction and outward rotation are greater.

In some cases the position of the head of the femur may be recognized by a rectal examination; or, in the case of females by a vaginal examination.

The flexion and abduction are due in some measure to the tension of the psoas magnus and iliacus internus, and perhaps to a similar condition of other rotators and flexors; but, according to Bigelow, the ilio-femoral ligament offers the chief resistance, and constitutes the chief impediment to the restoration of the bone.

W. Taylor¹ has reported an example of compound dislocation upon the foramen ovale, in which reduction having been effected, it was, several weeks after the accident, followed by an abscess; but from which he eventually recovered with a tolerably useful limb, but not without some ankylosis.

FIG. 346.



Tense, untorn, upward and backward portion of capsular ligament in thyroid dislocation. (Gunn.)

FIG. 347.



Illustrating what would be the degree of flexion in thyroid dislocation if the ilio-femoral portion of capsule remained untorn. (Gunn.)

Says Prof. Gunn: "In the dislocation downwards and forwards over the thyroid foramen, the anterior and inferior portion of the capsular ligament must be torn asunder for the escape of the head; while from the extremely abducted state of the limb at the moment of the accident,

¹ Taylor, *The Lancet*, 1881, vol. i. p. 732.

the superior and posterior portion must be relaxed, and thus escape laceration.

"Fig. 346 illustrates this dislocation and the condition of the ligament. It is seen that while the head of the femur occupies a position over the thyroid foramen, and while the characteristic deformity of direction in the limb is present, viz., a moderately flexed and slightly abducted position, the superior and posterior untorn portion of the ligament is tense and holds the limb in its state of slight abduction. The flexed position of the limb is due mainly to the necessarily tense condition of the psoas magnus and iliacus muscles.

"The characteristic position of the limb in this dislocation is inconsistent with the integrity of the ilio-femoral portion of the capsular ligament. The greatly increased distance between the anterior inferior spinous process of the ilium and the anterior inter-trochanteric line of the femur cannot be accommodated by anything less than the rupture of this portion of the ligament. The head of the femur *can* be placed over the thyroid foramen in the intact state of this portion of the ligament; but in order to accomplish this, the femur must be flexed to a right angle with the longitude of the trunk. This is illustrated in Fig. 347.

"An examination of this figure, or of the specimen which I herewith exhibit, will fully warrant the positive statement, that in the downward and forward dislocation, if the limb is found in the position generally characteristic of this form of the accident, the only untorn part of the capsule will be the upward and backward portion, as is illustrated in Fig. 346."

Treatment.—It is pretty certain that in the following example there was a spontaneous reduction, or rather, I ought to say, an accidental reduction of a dislocated femur from the thyroid foramen. Perhaps it was only an example of a partial dislocation; of which species of forward dislocation I shall hereafter relate another case as having come under my own notice.

Jacob Lower, æt. 10, fell from a tree, a height of about twelve feet, to the ground. It is not known how he struck. He became immediately quite faint, and when he had partly recovered, he attempted to get up, but could not. He said his leg was broken, and cried out lustily whenever it was moved. The father arrived in about an hour, and found him still lying on his back where he had fallen, with his right leg carried away from the other, and turned outwards. He lifted him up to place him in a small hand-wagon, which was long enough for his body, but only one foot and a half in width. Finding that his right leg was so much abducted as to prevent his being laid in so narrow a space, he seized upon it, and with some force pressed the knee inwards across the opposite leg, when suddenly it resumed its position with a loud snap like a "cannon." I use the language of the father. On the following day I examined the limb carefully, and found its motion free. He was, however, vomiting the contents of his stomach, and passing blood from the bladder quite freely. The vomiting soon ceased, but the hæmorrhage from the bladder continued three or four days. On the ninth day he walked out, and on the twelfth he was seen climbing upon the top of a house. I saw him again after the lapse of a year, and found that he

was still complaining of an occasional soreness in the region of the hip-joint.

If we attempt to reduce by manipulation, it will be proper to follow the same rule which I have stated as applicable to dislocations backwards, namely, to carry the limb, in the first instance, only in those directions in which it is found to move easily. Instead, therefore, of holding the leg in a position of adduction while the thigh is flexed upon the abdomen, it will be necessary to carry it up abducted; and when the further progress of the knee toward the belly is arrested, the limb must be moved inwards, and finally brought down adducted. When the knee is about opposite the pubes, or a little lower, in its descent, the femur should be gently rotated inwards, for the purpose of directing the head toward the acetabulum. The reduction may also be sometimes facilitated by lifting the head of the bone with the aid of a band passed under the upper portion of the thigh and over the shoulder of an assistant; by giving to the shaft of the femur a slight rocking motion when it is about to enter the socket; by pressing with the hand against the head of the bone, and by lifting at the knee.

Prof. Gunn proposes, also, to reduce this dislocation by lifting the head into its socket, while the thigh is at a right angle with the body, and in a position of forced abduction.

In one of the examples recorded by Markoe (Case 8), the reduction was accomplished in the second attempt, by rotating the thigh inwards just as the thigh had descended below a right angle with the body, in the manner which I have above directed; but in the second example (Case 9), a similar manœuvre carried the head across into the ischiatic notch, while the reduction was finally accomplished by rotating the thigh outwards, and at the same moment adducting the limb strongly in a direction which carried the knee behind the other one. Markoe concludes that the latter mode is preferable, because it will throw the head of the bone a little upwards as well as outwards; in which direction it will find a more gently inclined plane toward the socket. He admits, however, that both methods may accomplish the same result. But I am quite certain that the method by rotation of the shaft of the femur inwards is in general most likely to succeed. In this way also, I think, both W. H. Van Buren, of New York,¹ and R. L. Brodie, of the U. S. Army, were successful;² it is the method preferred by Bigelow, who also recognizes the propriety of making outward rotation when inward rotation fails. "Flex the limb toward a perpendicular, and abduct it a little to disengage the head of the bone; then rotate the thigh strongly inwards, adducting, and carrying the knee to the floor." It is especially worthy of notice that Anderson, so long ago as 1772, in the case already quoted when I was considering the history of reduction by manipulation, practised successfully almost precisely the same method. In one example mentioned by Markoe (Case 7), it is pretty evident that the head of the femur was thrown into the ischiatic notch, by having flexed the thigh too much, so that "the knee

¹ W. H. Van Buren, New York Med. Times, Jan. 1856, p. 127.

² R. L. Brodie, Memphis Med. Recorder, Sept. 1857, p. 98; from Charleston Med. Rev.

touched the thorax." Indeed, it is questionable whether it will be best ever to bring the thigh much, if at all, above a right angle with the body, since any further flexion can only throw the head below the acetabulum, when in fact it is already too low.

FIG. 348.



Reduction of thyroid dislocation by manipulation. (From Bigelow.)

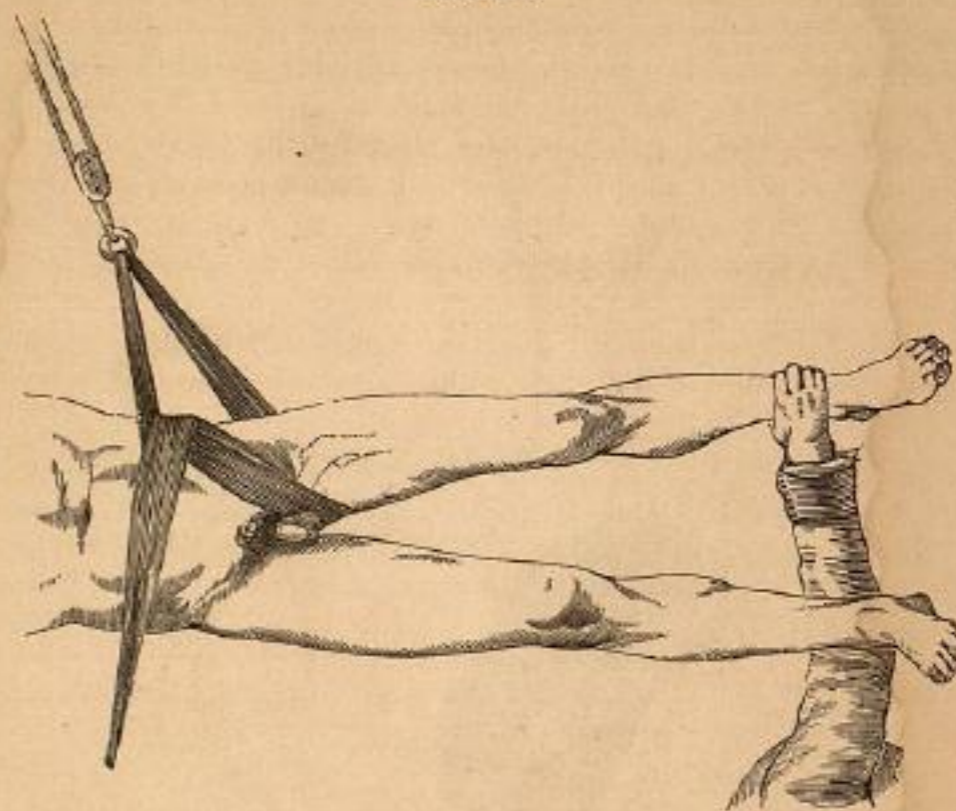
July 21, 1858, Nathaniel Smith, a painter by trade, æt. 33, fell from the second-story window of the city post-office, Buffalo, upon a stone pavement, striking, as he believes, upon the inside of his right knee. I saw him within an hour, and found the right tibia partially dislocated outwards, the corresponding patella dislocated completely outwards, and the right femur in the foramen thyroideum. His thigh was forcibly abducted, slightly rotated outwards, and lengthened, by measurement made from the pelvis to the ankle, one inch and a half. The distance from the anterior superior spinous process to the fold of the groin was ten inches, but upon the sound side it was only eight and a half. The head of the femur could be distinctly felt in front, just under the pubes.

Having administered chloroform, I first reduced the tibia and the patella, then seizing the thigh and leg, I flexed the thigh upon the body, carrying the limb upwards abducted until it was nearly or quite at a right angle with the body, then inclining the knee slightly inwards, I brought it down again, and when the thigh had nearly reached the bed, it fell into its socket with a dull flapping sensation. In every step of the procedure I followed the inclination of the limb. The recovery was rapid and complete.

Sir Astley Cooper says that this dislocation is in general reduced very

easily by the aid of pulleys; at least if the accident is recent. He advises that the patient shall be placed upon his back, with his thighs separated as far as possible. The pulleys are to be made fast to a band

FIG. 349.



Sir Astley Cooper's mode of reducing a recent dislocation into the foramen thyroideum.

drawn across the perineum of the dislocated limb, in a direction upwards and outwards; while a counter-band is to be passed around the pelvis through the band attached to the pulleys, and secured to a staple, or delivered to assistants placed upon the sound side of the body. When everything is arranged, the pulleys should be acted upon until the head of the femur is felt moving from the foramen thyroideum; at this moment the surgeon must pass his hand behind the sound limb, and seizing upon the ankle of the dislocated limb, adduct it forcibly, thus converting the limb into a lever of the first order.

If the dislocation has existed some time, he recommends that this procedure shall be varied by placing the patient upon his sound side instead of his back, and attaching the pulleys perpendicularly over the body. Sir Astley especially cautions us not to flex the thigh during these manœuvres, lest we force the head of the bone backwards into the ischiatic notch, whence he affirms that it cannot afterwards be returned to its socket; but the experience of surgeons has since shown that this latter statement is incorrect, and that it may, in some cases, be afterwards reduced, although it has fallen into the ischiatic notch. Mr. Liston says that this accident happened to himself while attempting to reduce a dislocation of only a few hours' standing, in a young and powerful man, but he had no difficulty in returning it to its first position.¹

¹ Practical Surg., Amer. ed., p. 93.

Brainard, of Chicago, reduced a dislocation of that form of which I am now speaking, after both the compound pulleys and Jarvis's adjuster had failed, by placing between the thighs a piece of wood wrapped about with several layers of a wadded quilt, and making use of this as a fulcrum upon which the thigh operated as a lever. The legs were simply pressed together, care being taken to keep the knees straight.¹

The majority of surgeons of the present day place the limb in the flexed position before attempting to make traction. This may be done with the patient lying upon his back, and by the hands, alone or with pulleys, or the patient may be placed in a sitting posture, and the extension made at right angles with the body. In all of these attempts to reduce by traction, measures must be taken to secure immobility to the pelvis.

May 23, 1868, a man, 40 years of age, was admitted to Bellevue, having a dislocation of the left femur into the foramen thyroideum,

FIG. 350.



Effect of flexion upon the ilio-femoral ligament in the thyroid dislocation. (From Bigelow.)

which had been caused six hours before by the fall of a heavy weight upon his back while stooping. The limb was slightly abducted, and moderately flexed upon the pelvis, while he was lying upon the bed; the position being that represented in Fig. 345. There was a very marked depression in the situation of the trochanter major, and a fulness upon the inside of the limb, caused by the tension of the long adductors.

The patient being under the influence of ether, the house surgeon, Dr. E. D. Hudson, first attempted, under my instruction, to reduce the dislocation by manipulation, flexion, and rotation, with adduction; but failing in this, a folded sheet was placed in the perineum corresponding to the dislocated limb, and committed to assistants, who were directed to

¹ Brainard, Northwestern Med. and Surg. Journ., 1852.

pull upwards and outwards, the patient lying upon his right side, with his left thigh flexed to a right angle with his body. Dr. Hudson then passed a band under the upper part of the thigh and over his shoulders, lifting and pressing the knee forcibly inwards at the same time. In a few seconds the reduction was accomplished.

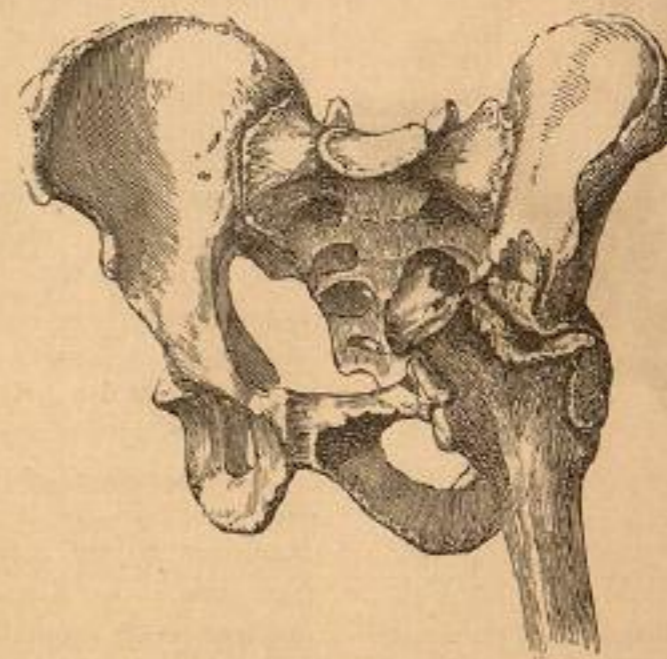
After the reduction is accomplished, the patient should be laid upon his back in bed, but instead of rotating the limb outwards, as I have advised after a dislocation upon the dorsum ilii or into the ischiatic notch, it should be gently rotated inwards, and the knees thus bound together.

§ 4. Dislocations Upwards and Forwards upon the Pubes.

Syn.—"Upwards and forwards on the horizontal branch of the share-bone;" Chelius. "Forwards upon the pubes;" Pirrie. "On the body of the pubes, below the spine and the transverse part of the bone;" Skey. "Sur-pubic;" Gerdy. "Ilio-pubic;" Malgaigne.

Causes.—This accident is generally occasioned by a fall upon the foot when the leg is thrown backwards behind the centre of gravity; as in a fall from the back end of a wagon, the foot being instinctively thrown backwards in order to save the head; or it may happen to a person who, while walking, suddenly puts one foot into a hole, in consequence of

FIG. 351.



Specimen of dislocation upon the pubes, in St. Thomas's Hospital. (From Sir A. Cooper.)

which the pelvis advances, but the leg and upper part of the body incline forcibly backwards. Occasionally it has resulted from a fall upon the back of the pelvis, or from a severe blow received upon the same part. A patient was admitted, under the care of Dr. Ure, into St. Mary's Hospital, London, with a dislocation upon the pubes occasioned by swimming. His account of it was, that when in the act of "striking out" he felt a catch in the right groin which he thought was cramp, and that he

was able to walk after the accident, but with a good deal of difficulty. The examination proved that he had a dislocation upon the pubes, which Dr. Ure easily reduced.¹

Pathological Anatomy.—Sir Astley Cooper dissected the hip of a person whose thigh had been dislocated upon the pubes for some time, the true nature of the accident not having been at first recognized. The acetabulum was partly filled by bone, and partly occupied by the trochanter major, both of which were much altered in their form. The capsular ligament was extensively torn, and the ligamentum teres broken off completely. The head and neck of the femur had torn up Poupart's ligament, so as to penetrate between it and the pubes, and lay underneath the iliacus internus and psoas muscles; the anterior crural nerve was lying upon these muscles, over the neck of the femur. The head

FIG. 352.



Dislocation upon the pubes below the anterior inferior spinous process of the ilium. (From Bigelow.)

and neck were flattened and otherwise much changed in form. Upon the pubes a socket was formed for the neck of the thigh-bone, the head being above the level of the pubes. The femoral artery and vein were to the inner side. The specimen is still preserved in St. Thomas's Hospital (Fig. 351). The head of the femur may be found lying far forwards upon the pubes, as in Physick's case mentioned below; or it may lie farther back, along the ilio-pubic margin, and rest below and in front of the anterior superior spinous process of the ilium. When the head rests directly below this process, the dislocation is considered anomalous or irregular, and this form will be considered hereafter as the "subspinous" dislocation.

In the accompanying drawing the relation of the ilio-femoral ligament to the head and neck of the femur is shown, when the head ascends moderately upon the pubes. The extreme displacement shown in the preceding illustration from Sir Astley Cooper is only possible where that portion of the

¹ Medical News and Library, vol. xvi. p. 1, from Lond. Lancet, Nov. 7, 1857.

As we have seen in the case reported by Sir Astley Cooper, the femoral artery and vein are usually found upon the inner side of the head, but occasionally these vessels are in front of, and sometimes external to, the head.

In a case related by Goldsmith, of Louisville,¹ where the femoral artery was situated in front of the head, and the dislocation remaining unreduced, at the end of two months a diffuse aneurism having formed, the primitive iliac was tied, and the patient died on the fifth day. The autopsy revealed an opening in the artery, through which the head of the bone had passed until it lay within the cavity of the aneurism.

Kronlein² reports a case of tearing of the femoral vein, in a case in which the leg had been thrown so violently backwards that the heel touched the back of the shoulder.

Says Prof. Gunn: The weakest part of the anterior and upper portion of the capsule is "where it is not reinforced by the ilio-femoral

FIG. 353.



External view of pubic dislocation. Posterior border of the great trochanter occupying the acetabulum, pressing before it the posterior untorn half of capsule. (Gunn.)

FIG. 354.



Anterior view; showing continuity of structure between the ilio-femoral and inferior border of posterior half of capsular ligament. (Gunn.)

fibres. Through this the head escapes and rests in front of the body of the pubis, the posterior surface of the neck resting on the edge of the acetabulum, and the posterior border of the great trochanter settling somewhat into the socket. The portion of the capsule which remains untorn is the whole of the posterior half, and that part of the anterior

¹ Goldsmith, Amer. Journ. Med. Sci., July, 1860, p. 30.

² Kronlein, Poinso, op. cit., p. 1072.

half covered and strengthened by the reinforcing ilio-femoral fibres. The posterior half is forced down into the acetabulum by the trochanter major, which encroaches upon that cavity." Being thus pressed into the acetabulum this portion becomes "moderately tense, but it does not exert much influence on this dislocation in any way. On the contrary, the ilio-femoral portion of the capsular ligament in front, with the posterior untorn portion from below the cervix, holds the dislocated head in its luxated position. In this dislocation, the ilio-femoral portion of the capsular ligament, by its continuity with the inferior border of the posterior

untorn portion, possesses the potency which Professor Bigelow claims for it in all dislocations."

Symptoms.—The thigh is shortened sometimes, but not always, abducted, flexed slightly, rarely extended, and rotated outwards. The trochanter major is carried back and lost, or nearly so, while the head of the bone may be generally felt like a round ball, lying upon or in front of the body of the pubes, in most cases outside of the femoral artery and vein. Larrey saw a patient in whom the femur was placed nearly at a right angle with the body; and Physick once met with a dislocation upon the pubes "directly before the acetabulum," in which the limb was not at all shortened, but, on the contrary, a very little lengthened.¹ Other surgeons have occasionally seen similar examples.

The *differential diagnosis* between a fracture of the neck of the femur and this dislocation may be thus briefly stated. In the fracture there is crepitus, mobility, slight eversion easily overcome, no abduction, the trochanter major rotates on a short radius, and the head of the bone cannot be felt. In this dislocation there is no crepitus, the limb is immobile, the eversion is extreme and not easily overcome, the thigh is often abducted, the trochanter major rotates upon a longer radius, and the head of the bone can generally be distinctly felt in its unnatural position.

¹ Dorsey's Surgery, vol. I. p. 238, 1813.

FIG. 355.



Dislocation upwards and forwards upon the pubes.

Prognosis.—Sir Astley Cooper remarks that although this accident is easy of detection, he has known three instances in which it was overlooked, and he cannot but regard such errors as evidence of great carelessness on the part of the surgeon who is employed.

The reduction has generally been accomplished, in recent cases, with no great difficulty; and when not reduced, the patients have occasionally recovered with very useful limbs.

Treatment.—From the several reported examples of dislocation upon the pubes reduced by manipulation, it would be difficult to draw any practical conclusions, since the methods have differed so widely from each other. I shall mention only four, which may be found in our own journals. One of these has already been mentioned in connection with the history of this process, as a case of compound dislocation reduced by Dr. Ingalls, of Chelsea, Mass.; and two examples were reported by E. J. Fountain, of Davenport, Iowa. Dr. Ingalls succeeded by carrying the limb into its greatest state of abduction, and rotating the thigh inwards; the replacement of the bone being aided also by pressing upon its head with his fingers thrust into the wound; while Dr. Fountain succeeded equally in both of his cases, by an almost opposite mode of procedure, namely, by adducting the limb forcibly, rotating the thigh outwards, and then flexing the thigh upon the body.

The first of Dr. Fountain's cases occurred in June, 1854. The patient, an adult male, had fallen from the second story of a house to the ground, fracturing his lower jaw, and dislocating his left hip. The limb was a trifle shortened, and the foot strongly everted. The prominence of the trochanter was lessened, and the head of the bone could be felt upon the pubes. Assisted by Dr. Arnold, he reduced the limb in the following manner: The patient was laid on the floor, and placed completely under the influence of chloroform. The dislocated limb was then "seized by the foot and knee and rotated outwards, the leg flexed and carried over the opposite knee and thigh, the heel kept well up, and the knee pressed down. This motion was continued by carrying the thigh over the sound one as high as the upper part of the middle third, the foot being kept firmly elevated. Then the limb was carried directly upwards by elevating the knee, while the foot was held firm and steady, at the same time making gentle oscillations by the knee, when the head of the bone suddenly dropped into its socket."¹ The time occupied was not more than thirty seconds, and the force employed was very slight.

The second case occurred on the 31st of October, 1855, in the person of John McCarthy, an Irish laborer; the dislocation having been occasioned by falling with a horse, while riding. The reduction was effected in about twenty seconds by the same process, and without the aid of chloroform.

Dr. Henry, of New York, successfully reduced a dislocation of the femur upon the pubes after twenty-six days. The first attempt, made October 23d, was unsuccessful. The second attempt was made October 29th. After repeated trials, by forced abduction and circumduction the head of the bone was thrown into the thyroid foramen, after which by

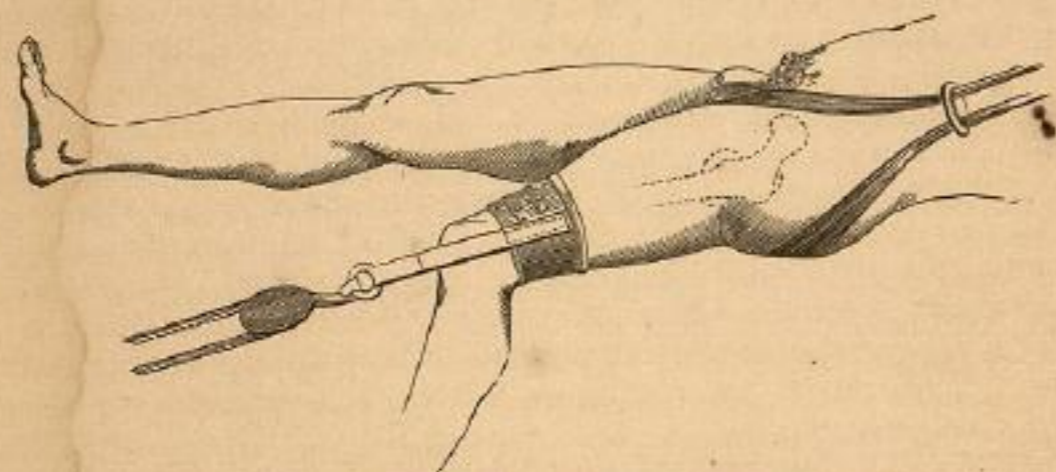
¹ Fountain, New York Journ. Med., Jan. 1856, p. 69 et seq.

abduction and extension it was conveyed into the acetabulum. He was dismissed cured in about three months.¹

It is probable that no one method will succeed equally well in all cases; but if the head of the bone, as in the case dissected by Sir Astley Cooper, has not only actually surmounted the pubes, but pushed itself fairly into the pelvis, then the limb ought to be abducted in the manner practised by Ingalls, and forcibly rotated outwards, in order that the head may be thus lifted over the pubes; and subsequently it should be flexed upon the body, adducted and brought down. But in this manœuvre we ought to be careful not to continue the rotation outwards after the head of the femur has risen above the pubes, lest the head and neck should grasp, as it were, the psoas magnus and iliacus internus muscles, underneath which they have been thrust. On the contrary, it will be necessary at this point to rotate the thigh again gently inwards, which, by compelling the head to hug the front of the pubes, will enable it, while the flexion is being made, to slide downwards under these muscles toward the socket. If, however, the head of the bone has never risen upon the summit of the pubes, and is not actually engaged under the muscles which pass over it at this point, then the rotation outwards will not be necessary in any part of the procedure.

Barron Larrey has reported a case of dislocation "before the horizontal portion of the pubes," which he reduced "by suddenly raising with his shoulder the lower extremity of the femur, while with both hands he depressed the head of the bone."² This is the same case of which I have already spoken as being attended with the unusual phenomenon of the thigh placed at a right angle with the body.

FIG. 356.



Reduction of dislocation upon the pubes, by extension.

If reduction is attempted by extension, the patient ought to be laid on his back upon a table, with the dislocated limb falling off slightly from its side. The extending band, made fast above the knee, should then be secured to a staple in the line of the axis of the dislocated thigh,

¹ M. H. Henry, Amer. Journ. Med. Sci., Jan. 1875.

² Larrey, Lond. Med.-Chir. Rev., Dec. 1820, p. 500; vol. i., first series, from Bulletin de la Fac. de Méd., No. 1.

and of course below the table; while the counter-extending band, crossing under the perineum, should be made fast in the same line, above the level of the table, and beyond the head of the patient.

When extension is commenced, and the head of the femur has begun to move, the reduction may sometimes be facilitated by lifting the upper part of the thigh with a jack-towel or a band passed under the thigh and over the neck of the surgeon, as I have recommended in both of the backward dislocations. It may be found advantageous also to flex and rotate the limb after extension has brought the head near the socket.

§ 5. Anomalous or Irregular Dislocations, or Dislocations which do not properly belong to either of the Four Principal Divisions before Described.¹

(Bigelow regards as "irregular" only those in which there is a complete disruption of the ilio-femoral ligament.)

1. Dislocations directly Upwards above the Margin of the Acetabulum, and below the Anterior Inferior Spinous Process.

Syn.—"Sus-cotyloidiennes;" Malgaigne. "Subspinous." "Sixth dislocation;" Mütter.

Malgaigne affirms that the head, in this dislocation, is situated external to the anterior inferior spinous process, and about one inch below the anterior superior spinous process.

It is in this position that the head of the femur is found in a specimen deposited in the Museum of the Surgical Clinic of Bonn, by Kronlein. A new cotyloid cavity exists posterior to and on a level with the anterior inferior spinous process.²

Blasius, of Halle,³ says he has been able to reproduce this dislocation upon the cadaver by forced extension (dorsal flexion), combined with adduction and outward rotation.

The symptoms which characterize this accident are shortening of the limb, slight abduction and extension, with rotation outwards. The eversion of the toes, together with the slight amount of shortening which has in general been observed, has led several times to the supposition that it was a fracture of the neck of the femur; but the rigidity, and the position of the trochanter and head will usually render the diagnosis clear.

The following was probably an example of the subspinous dislocation: Bennett Morris, æt. 51, was thrown backwards, in wrestling, in 1851.

¹ Malgaigne, Traité des Frac. et des Lux., tom. ii. p. 869 et seq. Samuel Cooper, First Lines, vol. ii. p. 391. Pirrie's Surg., Amer. ed., 1852, p. 275. Skey's Surg., Amer. ed., 1851, p. 110 et seq. Gibson's Surg., sixth American ed., vol. i. p. 386. Guy's Hospital Reports, 1836, vol. i. pp. 79 and 97; 1838, vol. iii. p. 163. London Lancet, Lond. ed., 1848, vol. i. p. 184; 1840, vol. ii. p. 281; 1845, vol. i. p. 412; vol. ii. p. 159. London Med. Gaz., vol. xix. pp. 657 and 659; vol. x. p. 19; vol. xxxiii. p. 404. Med.-Chir. Trans., vol. xx. p. 112. Lente's paper on "Anomalous Dislocations of the Hip-joint," in New York Journ. Med. for Nov. 1850, p. 314 et seq. Philadelphia Med. Examiner, No. 51. Amer. Journ. Med. Sci., vol. xvi. p. 14. New York Med. and Phys. Journ., 1826, vol. v. p. 597. New York Journ. Med., Jan. 1860, Dr. Shady's case. Dislocation of the Hip, by Jacob J. Bigelow, M.D., 1869.

² Kronlein, Poinset, op. cit., p. 1076.

³ Blasius, Archiv für Klin. Chir., Bd. 16, Hft. 1, p. 207.