about the room—possibly out-of-doors with his companions. Accidents, however, do occasionally occur with the young, and due care should be exercised in the after-treatment to meet all symptoms appropriately—especially any indication of peritonitis, a complication of lithotomy proportionally much more common in childhood than in later life.

THE MEDIAN OPERATION.

The median is known classically as the Marian operation, devised in the sixteenth century, and afterward largely adopted and improved in Italy. Allarton has been its apostle in England, and the modern opera-

Fig. 118.

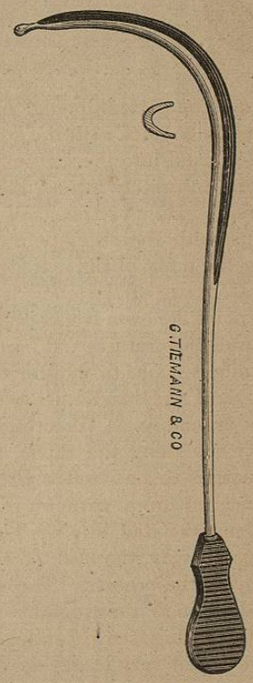

Fig. 119.

tion is known by his name. In this country Markoe first brought it into particular prominence, and the names of Little and Walter are also connected with it. Each of these three surgeons has enjoyed remarkable success with this operation.

Instruments required.—The only instruments necessary, differing from those employed in the lateral operation, are three: a staff, director, and knife. The staff, of appropriate size, has a central groove, with a broad flare. Markoe (Fig. 118) and Little (Fig. 119) have each adopted a staff. The groove of the latter is deeper, furnishing, its author believes, greater convenience and certainty in dividing the membranous urethra. A ball-pointed probe, or a director, known as Little's (Fig. 120), is generally employed, and a straight, stout, sharp-pointed bistoury, generally made to cut slightly upon the back for a short distance from the point.

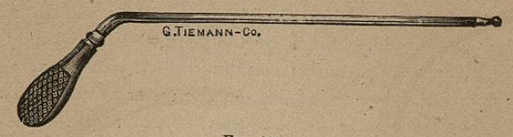

Fig. 120.

Operation.—The patient bound in the lithotomy position, and the staff introduced in contact with the stone, the operator passes the index-finger of the left hand into the rectum, familiarizes himself with the feel of the parts, and accurately locates the apex of the prostate, just where the staff enters it. He now transfixes the perinæum about half an inch above the anus, with the sharp-pointed bistoury, the cutting-edge upward, entering the point of the same, guided by his finger in the rectum, into the central groove of the staff, at the apex of the prostate. The double-edged point is now advanced very slightly into the groove, so as certainly to enter the urethra, and barely nick the apex of the prostate. Finally, the knife is made to cut forward and divide the membranous urethra within, and, the handle being elevated in the vertical plane, the blade is swept around so as (theoretically at least) to avoid the bulb, and cut its way out along the raphe, the external incision being from one and a quarter to one and a half inch long. Thompson prefers making the incision from without centrally inward. The director is now passed along the staff into the bladder, and, these two being separated in an angular way, the neck of the bladder is dilated, some urine flowing out during the process. The staff is now withdrawn, and a finger introduced through the wound, with which the dilatation is completed, without cutting the prostate or the neck of the bladder. The stone—necessarily not very large—is withdrawn, as in lateral lithotomy, and the general after-care of the patient is the same.

The operation yields excellent results; the patient sometimes retains control over his urine from the first. The wound usually heals rapidly. The objections to the operation are: its general inapplicability except for stones which lithotrity is more capable of managing, and the temptation to use violence during the extraction of a too large stone. It is emi-

nently applicable for small stones, in a bladder which will not tolerate the use of instruments without chill or other disturbance, for multiple small stones in the adult, and for oldish boys, too young for lithotrity, who by reason of budding and advancing puberty are not very good subjects for the lateral operation. Where rather large stones are extracted by this method, incontinence, sometimes lasting several years, may occasionally ensue. The median operation has been variously modified, as by being combined with single or double prostatic incision, but mainly in relation to the means resorted to to dilate the prostate. Instead of the finger, Arnott's fluid-pressure has been advocated and employed. It acts too slowly to be useful. Teale has devised a branched metallic dilator, and Dolbeau[1] another, the latter to dilate twelve millimetres, which is the average limit fixed by Dolbeau, from experiments on the dead subject, to which dilatation can be carried without any laceration or injury. The dilator is applied first to the outer wound, and then gradually inward, until the passage is dilated to the required limit, not far from half an inch, after which, in Dolbeau's operation, which he calls "perineal lithotrity," the stone, if of greater diameter than two centimetres, is crushed with a forceps resembling the heavy-jawed forceps (Fig. 107), and the detritus carefully extracted. The objections to the operation are, that calculi which could be so dealt with safely can, for the most part, be more safely cured by lithotrity, while, if the stone is large, the lateral operation, with double section of the prostate, and crushing *in situ*, is undoubtedly preferable.

SUPRA-PUBIC OPERATION.

The high operation for stone, designed by Franco in 1561, has still a respectable advocacy. It is applicable only to large stone, where the choice must otherwise be a perineal operation, with the additional danger of crushing *in situ;* or, recto-vesical section, with its possible resulting fistula; and, finally, in cases of deformed pelvis. Humphrey,[2] who speaks with authority upon the subject, and is quoted by Thompson, states that the dangers in the high operation do not increase in so great a ratio with the size of the stone as they do in the lateral operation.

For the proper performance of the high operation for stone, two conditions are essential: the bladder must be distensible, the abdomen not too fat.

The Operation.—The pelvis is elevated several inches, so as to keep the abdominal viscera from gravitating toward the bladder. The cavity of the latter is injected. An incision is made in the median line, three or four inches upward, from the symphysis pubis. The linea alba is exposed, and divided below, for about a quarter of an inch. Into this opening the aponeurotome (Fig. 121) is passed, and the linea alba

[1] "De la Lithotritie périnéale," etc., Paris, 1872.
[2] "Transactions of the Providence Medical Association, 1850."

divided with it, for about two inches upward. Now, the "sonde à dard" (Fig. 122), with the dart concealed, is introduced. By depressing its handle, the point is carried up close behind the symphysis pubis, where the "dart" is pressed out, and made to appear in the lower angle of the wound. Upon a groove in the stylet which carries the dart, the anterior wall of the bladder is incised nearly down to the neck. The hooked gorget (Fig. 123) is now caught in the upper angle of the incision in

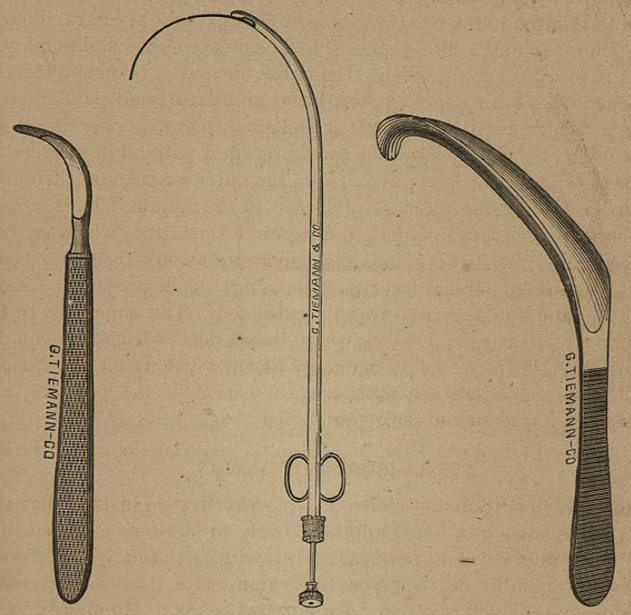

FIG. 121. FIG. 122. FIG. 123.

the bladder, and firmly held up by an assistant, while the stone is extracted. If the latter is very large, the wound in the bladder may be widened by lateral incision.

COMPLICATIONS OF LITHOTOMY.

Shock, exhaustion, septicæmia, pyæmia, erysipelas, possibly tetanus, may be encountered after lithotomy, and require to be met according to general surgical principles. Unusual complications in the way of hæmorrhage, besides those already alluded to, may occur in connection with the hæmorrhagic diathesis, or in those rare cases of irregular arterial distribution, where the main pudic trunk is defective, and its place supplied by an accessory pudic lying close along the border of the

prostate, or where the artery of the bulb is given off farther back than usual, or the main artery of the prostate enters the gland in a position exposing it to injury. These complications are met by especial attention to the means of arresting hæmorrhage, already detailed in describing the lateral operation. Secondary hæmorrhage sometimes comes on several days after the operation. Thompson has had four cases, two of which were fatal. The wound is small; ligature can rarely be applied. Thompson advises perchloride of iron, carried in upon lint at the end of a probe, or the actual cautery. Perchloride of iron might be injected. South reports arrest of the hæmorrhage in several cases by pressure on the pudic artery, long continued.

Peritonitis, more common in the child, may complicate the operation in the adult. The rectum may be wounded, or the perineal wound may inflame from mechanical injury or diathetic cause, resulting possibly in sloughing of a part of the rectum. Fistula may be left behind, retention may follow the operation, or temporary or even permanent incontinence, and even occasionally sterility, from obliteration of the ejaculatory ducts by section or subsequent inflammation. Epididymitis may come on, as after any operation involving the prostate. Cystitis may run high from injury to the bladder during extraction of the stone; chronic disease in the kidney may be kindled into an acute state. All of these complications are to be met according to suggestions already laid down in other parts of this treatise.

By far the most common complications after operation are inflammation of the parts around the bladder-neck (cellulitis), and infiltration, both due to the same cause—mechanical violence in extracting too large a stone, or jagged fragments, through an insufficient opening. Lack of vitality in the patient undoubtedly conduces to these results, and infiltration may be due to an incision surpassing the limits of the fibrous capsule of the prostate. But that infiltration is more often dependent upon tearing and laceration during the extraction of large stones, is advanced by Thompson, supported by the fact that in children infiltration is rare, although the incision, as a rule, in the lateral operation, generally surpasses the limits of the prostate, and notwithstanding the fact that in children the cellular tissue is particularly loose.

Relapse of stone is liable to occur if any fragment is left in the bladder, and no part of the operation requires more care than the thorough evacuation of *débris*, in any case where a stone has been broken intentionally, or accidentally crushed during extraction. If, after healing of the wound, any symptoms referable to stone should continue, a careful search may detect the fragment, while yet small, and furnish an opportunity for the use of the lithotrite.

CASE OF INSTRUMENTS FOR STONE.

The following instruments might be grouped into one case. They are sufficient to meet all the ordinary requirements of stone:

Thompson's searcher.
Thompson's lithotrite, heavy and light.
Evacuating catheter.
Urethral forceps.
Lateral lithotomy-staff, small and large.
Median lithotomy-staff.
Lithotomy-scalpel.
Straight, sharp-pointed, narrow, stiff-backed bistoury.
Blizard's knife.
Blunt gorget.
Little's director.
Scoop.
Lithotomy-forceps, with crossed handles.
Lithotomy-forceps, with curved blades.
Crushing-forceps, with extra piece.
Tube with globular head, for washing bladder.
Shirted canula.
Keith's tenaculum.

CHAPTER XIX.

DISEASES OF THE URETERS.

Anatomy.—Anomalies.—Chronic Inflammation.—Dilatation.—Stricture.—Wounds.

The ureters are the excreting ducts of the kidneys. They run down on either side behind the peritonæum from the kidney over the brim of the pelvis to the base of the bladder, and pass through its coats in an oblique, valvular way, making two of the angles of the trigonium Lieutaudii, of which the internal orifice of the urethra is the third. The structure of the ureters is mainly muscular. There is an inside mucous membrane, then come the circular and longitudinal layers of unstriped muscle, bound together by connective tissue.

Not very infrequently the ureter is double or triple; the abnormality existing through the whole length of the canal, or, more commonly, the several branches uniting above at a distance of one or more inches from the pelvis of the kidney, to form one canal from that point on into the bladder. Occasionally there is but one ureter. Sometimes the ureter ends in a blind extremity, in which case the kidney cannot functionate, and atrophies.