OBSERVATIONS UPON THE STRUCTURES TO BE INCLUDED IN THE SUTURES IN THE OPERATION FOR FIXING A FLOATING KIDNEY.

BY L. H. DUNNING, M.D.,

OF SOUTH BEND, INDIANA.

The question which the writer will discuss more particularly in this paper is, Shall the Renal Capsule be included in the Sutures? That this is an important question and one that has not been definitely settled, those familiar with the medical literature of the last few years are well aware.

The writer has deemed it advisable to refer to some of the statements of a few of the writers upon the subject. Morris¹ states that "In Hahn's first two cases the sutures included the peri-renal fat, and one of them was unsuccessful. In the third case he included the renal capsule in the stitches, but with what result is not stated. Gilmore² included the renal capsule but the suture cut its way out and set the viscus free. Weir³ included in one case the peri-renal fat and was successful. Morris concludes that "Experience will have to decide whether there is any necessity of penetrating the envelope of the kidney." He goes still further, and says, "It is not adequately proved that any suture is requisite to attain the end in view."

Lucas,⁴ in a discussion at the annual meeting of the British Medical Association, says: "Painful moving or floating kidney, being only a mechanical disturbance, admits of relief only by mechanical means. Simple exploration and replacement through an incision in the loins, would probably be sufficient, in a majority of cases, for the cure of this condition, the adhesions resulting serving to retain the organ in position. Stitching the capsule to the parietes, or, as it is termed, nephrorraphy, is a somewhat serious but still simple undertaking. In eight patients in which it has been performed, the patients have all recovered and were relieved." In a previous article⁵ the writer took the ground that if the peri-renal fat and capsule are intact, *i. e.*, if they retain their intimate relations to each other and to the kidney, which may be ascertained when the organ is exposed by the incision, there is no need of including the nearer investing capsule. The reasons for this conclusion were based upon experiments briefly stated. Since the publication of that article the writer has made numerous experiments upon the kidney of animals just slaughtered, a few observations upon the kidney of the cadaver, and has had one opportunity to verify his conclusions by experiments made upon a patient during an operation for fixing a floating kidney.

The animals seen by me and experimented upon were sheep, calves and beeves. I was present when they were slaughtered and hung up, so that my observations respecting the kidney commenced a few minutes after the death of the animals. When first hung up and opened, the organ in question in all the animals was quite movable, especially so in the sheep,

in which it could be moved back and forth and up and down several inches, without doing violence to any investments of the organ or to the ureter, blood vessels or nerve. The right organ was slightly more movable than the left and slightly larger. It was found, on moving the kidney, that not all the perirenal fat went with it but that the organ was uniformly surrounded, except a small area upon the anterior inferior aspect, by an investment of fat that accompanied it in all its movements. This investment was found to be quite firmly adherent to the renal capsule and the nerve vessels and ureter for a short distance nearest the hilum. It was not so closely adherent, however, but that considerable freedom of movement of the kidney was possible within the investment. By grasping the fat in the hand, just below the inferior portion of the kidney, and making gentle yet firm pressure, the kidney could be made to ascend from three eighths to half of an inch, without doing violence to any of the tissues under observation.

The fat investing the kidney was connected with that lying upon the psoas and quadratus muscles by irregular bands of adipose and connective tissue, so that the movements of the kidney were restricted to certain limits. It was observed with considerable interest that the attachments of the adipose tissue to the capsule were quite as difficult to break up as it was to tear the adipose tissue. These attachments seemed to me to be the strongest about the center of the two surfaces of the kidney and near the hilum. That small area but lightly covered with fat possessed interest to me and was carefully examined. On close inspection, it was found that a thin layer of connective tissue, with its attachments to the capsule, stretched across this surface and was lost in the adipose tissue surrounding it. I tried, in various ways, to forcibly remove the kidney from its investing fat without doing violence to that organ. The only way I accomplished it, without lacerating the kidney, was previously incising or tearing the fat by squeezing it with the hands in various directions. When the organ did leave its investment, the direction it was most prone to take was downward and forward.

Before proceeding to another branch of the subject, let me briefly summarize. There was found,

1. A normal, not exact, range of mobility.
2. An investment of fat accompanying the kidney in all its movements, except an up and down movement, within its own circumference.
3. The attachments of the tissue were as strong as the tissue itself.
4. It was difficult to remove the kidney from its investment without lacerating it.

Now, if it be shewn that these conditions are identical with, or analagous to, the conditions found in the living man, then we have some light received that will aid us in deciding the question. Morris says experience will have to decide. A part of the conditions I have described as having been found present in the lower animals just slaughtered I have been able to demonstrate as having been present in at least one human being. On October 10, 1885, assisted by Drs. Hitchcock, Kittering and McAllister, of this

¹ International Cyclopædia of Surgery, Vol v, p. 1096.

² Ibid.

³ N. Y. M. Journal, Vol. 37, p. 170.

⁴ JOURNAL AMERICAN MEDICAL ASSOCIATION, Jan., 1884, p. 82.

⁵ THE JOURNAL, Feb. 21, 1885.

city, I did the operation for fixing a floating kidney, the patient being an unmarried female, 35 years of age. Before the operation, it was easily demonstrated that the right kidney, by a change of the position of the body, would move transversely across the abdomen about four inches and downward and forward about five inches. There was nothing unusual about the operation, except that the space between the twelfth rib and the crest of the ileum was so short that a slightly crucial incision was made, three inches long, commencing within two and one-fourth inches of the vertebral column, on a level with the lower border of the twelfth rib, and extending downward and outward. No difficulties were encountered in cutting down upon the kidney. As soon as the cellular tissue covering the adipose tissue was cut through, quite a quantity of that tissue projected up into the wound and was cut away with scissors. With a finger in the wound, I made search for the kidney and found it after well-directed pressure had been made over the abdomen. The kidney was observed to be uniformly surrounded by fat, except that the investment was thinner over the anterior inferior aspect of the viscus. This investment accompanied the kidney in its movements away from the incision. A portion of it was seized with dressing forceps and the mass (kidney and investment) was drawn down to the edge of the incision. Now, I could, and did for the most part, examine with the finger every portion of the external surface of the kidney. The envelope was found intact, as just described. With two fingers in the wound I could move the kidney slightly upward and downward in its fatty envelope, and further, could distinctly feel the upward and downward movement of the viscus during inspiration and expiration.

It is not likely that these points would have been all observed had not the experiments above outlined been conducted previous to the operation. Now was forcibly brought to my mind a fact I have never seen stated, viz: No means of fixing a movable kidney should be employed that does not comprehend and admit, to a considerable extent at least, the normal movements of the viscus during inspiration when changes of the position of the body occur. The mobility of this organ is undoubtedly Nature's method of preventing undue pressure being made upon it during respiration and postural changes. Undue and uneven pressure would undoubtedly induce disturbances of circulation, with its attendant evils, some of which might and would likely be disastrous.

Which method, then, shall be employed in anchoring the kidney, or, in other words, what structures shall be included in the sutures? Simple incision and replacement of the organ has been suggested, but I have not yet read or heard of any one who has had sufficient confidence in this method to employ it. I have no confidence in it since, in both cases in which I have operated, the kidney was inclined to slip away the moment the abdominal pressure was removed, or there was the slightest change in the position of the body of the patient. It would undoubtedly be the preferable method provided it were successful, for then fixation would occur with-

out undue adhesions and with an unbroken capsule, both of which results are desirable. As between the two methods of suturing, it seems to me there are valid and conclusive reasons for adopting one and rejecting the other, and, in order that these may be made more apparent, the structure, attachments and office of the renal capsule should be considered. This capsule is made up of dense areolar tissue. In its structure the white fibrous tissue is largely in excess of the yellow elastic tissue, hence it is very firm and nearly inelastic. That it is practically inelastic may be shown by taking a strip of the capsule two inches long and half an inch wide; seize each extremity by a pair of forceps and make gentle yet firm traction, and it will be found that before any appreciable stretching of the strip will occur it will tear at the edges or at the limits of the grasp of the forceps. Take in the hand a kidney with the capsule intact. With a conjunctive forceps raise a portion of the capsule and separate it from the kidney over a considerable area. Now the capsule can be drawn away from the kidney, but in so doing the shape of the kidney will be invariably changed in ratio to the amount of force used, thus shewing a lesser density and greater elasticity of the structure of the kidney than that of the capsule. Other points may be observed. The capsule is easily torn if once an opening be made in it. Stitches passed with a needle with cutting edges tore out with less force applied than those passed with a round needle. The capsule is denser and thicker as it approaches the hilum. In this region the attachments are strong, the tissues dense and the capsule is two or three times as thick as elsewhere. That portion lining the sinus and reflected upon the ureter nerve and blood vessels is so strong and so firmly adherent that careful dissection or strong force is requisite to detach it. Here is a wise provision of nature, and here is found the great reason why a moving kidney pushed far away from its moorings, at times falling by its own weight or pushed downward by pressure, is not more frequently or more intensely painful.

Take the kidney in one hand and the ureters and vessels in the other. Hold the kidney firmly and make strong traction upon the cord. Now you can readily demonstrate that until the capsular adhesions are broken up or the capsule itself torn, there cannot possibly be any stretching of the nerve, blood vessels or terminations of the ureter, within the kidney; for in this effort all force exerted is expended upon the capsule, its attachments, or the structures to which it is adherent. If sufficient force be used, the kidney will be lacerated before the other structures will give way. This fact I noticed in my experiments; gentle yet firm force, intermittently applied, did, in a few instances, cause a gradual separation or giving way of the capsular attachments, and the stretching or traction upon the internal nerves, blood vessels and ureter could be readily produced. It seems to me probable that this sometimes occurs in the patient, and then occur the attacks of intense pain sometimes experienced by subjects of floating kidney. Two other offices of the capsule of the kidney may be mentioned. It acts as a barrier to the spread

of inflammation to the kidney from surrounding structures or organs, and furnishes a surface for the attachment of its fatty envelope.

In view of the facts stated, it seems certain that if the renal capsule be included in a sufficient number of sutures to hold the kidney firmly in position at the bottom of the incision, the normal movements of the organ will be entirely prevented, and thus it will be subjected to undue pressure. This is the greatest objection to suturing the structure under consideration. In truth, it would appear to be a sufficient reason for absolutely condemning such a procedure. Other reasons opposed to such a procedure are apparent when the facts already stated are remembered. Should the sutures cut their way out of the capsule—and this they would be likely to do since the movements of the viscus are from above downward, so that every respiration of the patient brings a strain upon the sutures in such a direction as to render them likely to tear or cut the tissues they include—we have then a broken capsule, which will render the attachments of the invest-fat less effective, and in part remove the barrier to the spread of inflammation to the kidney. It would also render less secure the attachments of the capsule to the organ near the hilum and thus diminish the protection to the ureter, blood vessels and nerves against violence in the movements of the kidney. To some it may appear that the last mentioned danger is imaginary, or at least remote. That it is remote may be conceded, but it is none the less real and is entitled to some weight in deciding the question under discussion.

Having thus shewn what I deem valid and sufficient reasons for condemning the method of including the capsule in the sutures, it yet remains to shew the advantages and efficiency of suturing only the perirenal adipose tissue. What we should aim at in this operation is to firmly fix the kidney in a favorable position, in such a manner as to permit of sufficient motion to prevent undue pressure being made upon it, and that too with an unbroken capsule. The facts already stated in this paper are the basis of my conclusion that these desiderata can all be realized by stitching the investing fat to the edges of the incision. This investment, with its attachments, when intact, are strong enough to permit the kidney to be favorably placed and held in position, and when so held the organ will have considerable freedom for motion within the circumference of its envelope. The capsule will be untouched. Experience has shewn that in a vast majority of cases this method has been successful in anchoring the kidney and in affording relief. If the nearer investing fat be intact and included in the stitches, the writer cannot see how anything more desirable for a good result can be obtained. If failure be the result, it must be from causes independent of the method of operating.

The writer now ventures the opinion that in cases favorable for operating and in which there were failures, either the kidney had left its fatty envelope or else there was little or none of it included in the sutures; and, furthermore, that in some of the cases in which the capsule was supposed to have been raised and penetrated, only a portion of this struc-

ture was stitched to the parietes. In his first case, the writer now believes he was so deceived, for experiment has shown him how difficult it is to separate and lift away from the organ sufficient of the capsule to be included in the threads, even after the removal of all adipose matter.

The writer's conclusions may be stated as follows:

1. The kidney has a normal range of motion.
2. The operation for fixing a floating kidney should comprehend and permit, so far as possible, this normal range of motion.
3. The capsule should be left unbroken, and, if possible, free from adhesions.
4. Stitching the capsule ignores the fact stated in the first conclusion and prevents the realization of the desideratum mentioned in the second, and from its very nature precludes the accomplishment of the second named desired result.
5. Suturing the fatty envelope recognizes the truth of the first conclusion, and fulfils the indications of the second and third conclusions; hence it is the method greatly to be preferred.

MEDICAL PROGRESS.

MATERIA MEDICA AND THERAPEUTICS.

GELSEMIUM AND ITS REPORTED ANTIDOTES.—DR. EMIL G. REYFUSS, of Philadelphia, at the close of an article on this subject, draws the following conclusions from his experiments on animals:

In the case of ammonia carbonate *vs.* gelsemium, the results were not only negative, but we had increase not only in the number but also in the intensity of the convulsions, death being accelerated in every case.

In the case of alcohol, the convulsions were of a milder type, but a fatal issue resulted in every case.

The same negative results were noticed in using the above two reputed antidotes together at the same time, with the exception that the onset of the convulsions were of quite a mild nature; those occurring later were, however, very severe, ending in death.

Morphine retarded death somewhat, and considerably moderated the symptoms.

Atropine. The same may be said of this agent as of morphine, it, upon the whole, affording somewhat more satisfactory results, though it did not prevent death occurring.

I am led to conclude, from a careful study of this subject, based upon the results of my experiments, as well as on the collection of cases occurring in the human subject, that in treating a case of poisoning by gelsemium in the human subject an emetic may be given at the very onset. One should not stop here, as little reliance can be placed upon the efficacy of the same, it appearing by reading the cases recorded that emesis took place only in one case in which emetics were used. Owing to the easy obtainment of such stimulants as ammonia carbonate, brandy, and tinct. digitalis, etc., these should be resorted to at once. In addition, I would suggest the early and repeated use of small doses of atropine