one of the men has already well exceeded the allotted span of human life, while the other two have passed 50, and should not fall far behind their father's record of long and healthy life.

The appended table gives in parallel columns for purposes of comparison some measurements taken from one of these men, with corresponding figures obtained from a

normal man, 5 ft. 8 in. in height, this being generally taken as the average for healthy men in England and Wales. Some of the striking features of the achondroplastic skeleton are there well seen. Thus with a total deficiency of 16 in. in height, the shortness of the legs is responsible for all but 2½ in. of this amount.

	Normal.	Achondroplastic man.
Total height	5 8	4 4
Height sitting	2 10½	2 8
Anterior superior spine to internal malleolus	2 11¼	1 9½
Anterior superior spine to inner tuberosity of femur	1 7½	0 11½
Tubercle of tibia to internal malleolus	1 2¾	0 7½
Clavicle	0 7¼	0 4¾
Acromion to external condyle	1 0¾	0 8¾
Radius	0 8¾	0 6
Ulna	0 10	0 7½
Chest: full expiration	2 10	2 4½

The photographs are by Hermann C. T. Gardner, F.C.S.

ON THE USE OF TAXIS FOR HERNIA, AND ON SOME COMPLICATIONS THAT MAY ARISE DURING AND AFTER ITS EMPLOYMENT.

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In bringing before you to-day such a simple subject for your consideration I need make no apology, for at the present time opinions are changing, and differ considerably as to the propriety of employing taxis as a remedial measure.

The term "taxis" means the reduction of a hernia by manipulation, and in extension would include also the ordinary reduction effected by the patient himself in putting back his hernia. The expression is more usually limited to that procedure of a more purposeful character which is adopted when the hernia fails to return as it should, and where there are associated symptoms which indicate some altered relationship of parts.

To-day we are going to deal with taxis as a measure to be employed when there are signs present of strangulation. There are many that urge that taxis should never be tried for strangulation, and would advocate operation for all cases. It must be allowed that inspection of the contents of the sac is the only ideal method that is consistent with a maximum of safety and a minimum of risk. If all, or even the majority, were submitted to operation, there is no doubt that a certain number of cases where had symptoms subsequently arise would be satisfactorily dealt with, and our statistics would considerably improve. I myself am at one with those who insist that for safety's sake operation is the ideal method of treatment; but I feel sure that the complete abolition of taxis for strangulated hernia is not at the present time likely to be generally accepted, and that you in general practice would have some difficulty in dealing with some of your cases should taxis be altogether abandoned.

If we, then, assent to the proposition that taxis for strangulated hernia is not likely to become a dead-letter, we must have a clear conception as to the right way to do it, and as to the cases in which it may be, and those in which it should not be, attempted.

In performing taxis the pressure on the hernial sac must be gentle, steady, and equal all over the tumour, and it should be in the reverse way to the normal descent of the hernia. At the same time support should be given by the other hand to the neck of the sac, so as to steady it. If intestine is in the sac it will be gradually emptied of its fluid and flatus, and should then return with the characteristic gurgle. It is usually directed that the tense structures pressing on the sac should be relaxed, and for this purpose the thigh is flexed, adducted, and rotated inwards.

By some this has been taken exception to; it being considered that the taxis is more likely to succeed when the fibrous tissues outside the sac are tense; thus, with an inguinal hernia the thigh would be extended, and in a femoral it would be adducted and rotated outwards. Perhaps if this is true it is the support given by the fingers to the neck of the sac when the fibrous rings are relaxed that prevents disaster. What, however, is very certain is that if the taxis is improperly done mishaps can easily occur.

Irrespective of the length of time it may be tried, one knows that the attempt to reduce the hernia is frequently a continuous push on the lower pole of the sac, forcing the whole up towards the abdomen, and if this procedure is done without any support to the neck then certain dire results may ensue, about which I shall speak to you presently.

With experience, the manipulation of a few moments will, as a rule, decide whether reduction is likely to take place; when it does occur, the contents go back with a characteristic gurgle, especially if gut occupies the sac. Success is more likely to be obtained if it is done under chloroform, and particularly after a hot bath.

Now, when the sac contents have been apparently satisfactorily reduced, we have, however, taken a leap in the dark, for what do we know as to the pathological conditions

* Read before the Norwood Division of the South-Eastern Branch.

present in the sac or its contents? We assume certain things and hope for the best. If strangulation has been for only a limited period, we consider that in the time very little damage can have occurred, but outside somewhat narrow limits we stand to risk a great deal. What do we know as to the nature or septicity of the effused fluid in the sac, or as to the condition of the coil of bowel, how damaged its walls are, or how much ulceration has occurred at its neck, or anything about adhesions, whether they are of the bowel itself to the neck of the sac or between the bowel and omentum; and, lastly, what is the condition of the sac itself?

There are certain conditions in which it is inadvisable to attempt taxis at all, and operation should be immediately done. If there is much vomiting, especially if this is stercoraceous, hiccough, collapse, signs of inflammation over the tumour, or marked abdominal pain, there should be no delay. The time factor, again, when the above symptoms are not pronounced, has to be considered.

Speaking generally, inguinal and umbilical herniae will stand strangulation with less acute damage. The reason for this is that the constriction is more often due to the fascial structures of the abdominal wall, which vary in tension, and thus do not exert such a continuous pressure on the sac and its contents. In these cases, although the signs of strangulation may have been of the mildest form, a three days' history should demand operation, and it may be said definitely that if after twenty-four hours the symptoms are at all severe it is wiser not to try taxis; up to this time, except under special circumstances, it should be safe in the majority to do so.

There are certain cases of inguinal hernia in which, although the signs of strangulation may be of quite recent onset, I would counsel early operation. These are the congenital and funicular forms, where the sac results from the persistence of the whole or upper part of the processus vaginalis testis. Here the constriction is in the form of a ring about the neck of and in the sac itself, and it is due to the progressive attempt at closure between the peritoneal cavity and the funicular portion. This ring produces an uncompromising pressure, and the symptoms of strangulation are frequently very acute. Such forms of hernia, although more likely to be met with in early life, occur in young adults or later. In young children a relatively small proportion of the cases become strangulated, and of these in the majority the reduction by taxis is not difficult, as there is not such rigidity of the ring in the neck of the sac; in adults, however, this ring is often very tight, the effect being that a line of ulceration in the bowel may form very rapidly, or even gangrene occur.

In the case of a femoral hernia there is very little margin for delay, for the tense unyielding tissue about the neck of the sac, here Gimbernat's ligament, very rapidly forms a line of ulceration in the bowel, which may give way in the taxis, or after the return of the bowel into the peritoneal cavity. For this reason, if it is determined that the sac contains a knuckle of gut, it would be far safer to operate at once. One would probably be guided by the severity of the symptoms, but, any way, delay is inadvisable after the end of twenty-four hours. If the surgeon felt sure that the sac only contained omentum a little more latitude might be allowed.

Let us now consider some ill results which may follow taxis where all the hernial contents have been effectually reduced. Certain of these may be directly due to the procedure, when the cases dealt with are even within the limits laid down for its apparently safe performance. Vigorous manipulation of the gut, which is already congested and oedematous, may cause extensive bruising; this may be shown by haemorrhage into the bowel, accompanied probably by diarrhoea. Rough handling may induce a subsequent gangrene, or may cause a tear at the seat of constriction, which leaks after reduction; in both of these cases septic peritonitis will follow.

If taxis is performed, outside the limitations advised with all care, the contents of the sac may be in such a condition as to cause contamination of the peritoneal cavity. The fluid may infect the peritoneum, perhaps only locally; the gut may be gangrenous, or on its way to become so; the line of ulceration may be so deep that perforation takes place almost immediately. These possibilities are the strongest argument for actual inspection of the existing condition of things, especially in the cases

where such effects are more prone to occur, namely, in the femoral and congenital inguinal herniae.

After a successful taxis performed in properly selected cases, and without the subsequent troubles just related, symptoms of obstruction may persist, the cause of which it cannot be gainsaid would in many cases have been cleared up by an open operation. Instances of such would be where the gut is strangulated in the sac by adherent omentum, or by adhesions between the coil or coils of intestine. In another case exploration of the irreducible contents of a sac may show that there is here no cause of strangulation, and that the real cause is within the abdomen, as from a band or volvulus, or from a ring, stricture in the large bowel. A condition allied to the above is where again real reduction of the tumour has taken place, but the bowel is pushed under an adhesion in the neighbourhood of the internal ring. The following is a case in point:

G. C., a stableman, aged 45, was admitted under my care at St. Thomas's Hospital on January 22nd, 1900. He had had a right inguinal hernia for ten years, which at times he had had trouble in reducing; he had never worn a truss. Four days before admission the hernia had become painful, and he could not reduce it. He became very sick, and continued so. There was no action of the bowels and no flatus passed. Attempts at taxis had apparently reduced the hernia, but his symptoms remained the same. On admission he was in a state of collapse, with a temperature of 97.4°. A lump was to be felt in the region of the appendix, but there was little abdominal distension, and his inguinal canal was quite free. At the operation an incision was made over the outer border of the rectus, and on opening the belly a loop of gut was found obstructed by a band, which was wide and firm, stretching from the posterior wall of the hernial sac, just within its mouth, upwards, inwards, and backwards to the posterior parietal peritoneum. The mouth of the sac was a little pulled up towards the abdomen. The constricting band was divided, and removed close to its attachments, and the imprisoned bowel set free, none the worse for its nipping. A radical cure of the hernia was done at the same time. His bowels were opened the next day, and he made an uneventful recovery.

I will now pass on to speak of cases of "false reduction," where the hernial swelling has been made to disappear, but there is no relief given to the symptoms, because the constricting cause remains undisturbed.

The simplest form of such would be in the case of a large hernia, where apparently it is completely reduced, but a small knuckle of gut is left nipped deep down in the ring. This is incomplete reduction, and to avoid this be careful to feel if the sac and its rings are quite empty.

In the next group of cases it must be borne in mind that some of these disasters have a causal relationship with ill-conducted or prolonged taxis. A lack of support to the neck of the sac, or a continuous pushing on the lower pole of the hernial tumour will cause loosening of the subperitoneal connective tissue about the neck of the sac, and so facilitate certain misplacements.

The first class to which I would draw your attention is when the sac ruptures in the neighbourhood of the sac on its distal side, and the sac contents are gradually squeezed through this hole into the subperitoneal connective tissue, and the sac is emptied. Birkett, who first drew attention to this possible accident, says that the rent is usually on the posterior wall. If there is no suspicion of anything abnormal having occurred at the time, we shall soon, however, become cognizant that all is not well, because the former symptoms persist and become more marked. Palpation locally should demonstrate abnormal fullness, with an empty hernial sac. In these cases, if care is exercised in the taxis, the surgeon's suspicions should be aroused if reduction has taken place without the usual somewhat typical sensation when the hernia slips back.

Closely allied to the last would be the instances recorded in which, again, rupture takes place distally to the neck of the sac, but only the fluid in the sac is displaced into the subperitoneal tissue. What here is so deceptive is that the whole of the tumour may appear to have been reduced, whereas a small knuckle of gut remains strangulated deep in the neck. It is stated that as a result of an energetic taxis the constricting ring at the neck may alone be torn away, and reduced into the belly with the bowel.

The next class of case is where after a prolonged taxis the whole sac with its contents is made to disappear in the connective tissue behind the abdominal or pelvic walls, particularly in the iliac fossa. We are indebted to the

French surgeons of the early part of the last century for its recognition, and also for the term by which it is generally known, "*reduction en bloc*" or "*en masse*." Luke, in this country, first described it in the *Transactions* of the Medico-Chirurgical Society, vol. xxvi, p. 159. Examination will show that the inguinal region and the rings are free, but a lump will be felt behind the abdominal wall. It has only been recorded in connexion with old inguinal herniae. In the reduction the hernia would have disappeared without the characteristic gurgle, and symptoms of obstruction would remain. Instances of it are rare, and the following case, which was under my care in St. Thomas's Hospital, is a good example:

C. C., aged 52, had been ruptured for ten years, for which he had worn a double truss. This latterly had not been satisfactory, failing to keep up the tumour. On November 19th such happened, and he was unable to reduce his hernia; he tried to do so himself for two hours, but being unsuccessful he sent for his doctor, who after some three hours came in the afternoon, did taxis for half an hour, and apparently reduced the hernia. Soon after there was pain, followed by nausea, and then he vomited on three occasions in the evening. I was called to see him on the next mid-day (20th); he had then bilious vomiting, with a dry, brown tongue. His pulse was 88, a little tense, but this was possibly due to arterial degeneration. His belly was soft, and the inguinal canal was empty of any hernial tumour, but there was some puffiness over the external ring. Deep behind the abdominal wall, about the brim of the pelvis, could be felt a lump, but nothing abnormal could be detected per rectum. His testis was normally placed, and he was certain that he had had no hernia in early life. An operation was done immediately. On slitting the external oblique the tissues of the cord were greyish, with some blood extravasation and some oedema. The connective tissue over the front of the cord as well as loosened and lacerated, and no sac could be seen. On pulling on this loose subperitoneal tissue a rounded dark swelling came up from the margin of the pelvis. This was the displaced sac containing the strangulated bowel. This was opened up, and blood-stained fluid and recent fibrin were set free. The loop of bowel was dark, of good polish, and appeared to have been especially nipped over the free margin, as occurs in a Richter's hernia, and the explanation of this was forthcoming when the sac was further examined. This had a small orifice, just taking the little finger with a squeeze (three-eighths of an inch), in which the small portion of the bowel's lumen had become wedged. The size of the sac distally to this was not more than a pigeon's egg; centrally to the constricted opening was a well-marked peritoneal pouch, with a wide opening into the cavity. It is probable that this constriction represented the original internal ring, which had been gradually displaced downwards. There was no omentum in the sac, and the portion of the bowel involved was the ileum. A Bassini's operation was done, and the after-progress calls for no comment except for the supervention of a haematoma of the cord, which was probably related with the bruised state of the connective tissue seen at the operation.

Reduction *en masse* may also take place between the planes of the abdominal muscles.

There remains for our consideration another very interesting condition, where obstruction persists after reduction, namely, when there is a bilocular sac, and the intestine is simply forced from its sac in the inguinal region into one occupying a posterior position, the lower sac not being displaced as in reduction *en masse*. The second pouch will be distally placed to the site of the constriction, which is usually at the internal ring, but it may be placed between the layers of the abdominal wall, forming the interparietal form of interstitial hernia; or behind the abdominal wall in the subperitoneal tissue, when it is termed "properitoneal." The clinical history in this last form is practically the same as with a reduction *en masse*, and differentiation only takes place at the operation.

A very marked example of a properitoneal hernia was described by me in the *Transactions* of the Medico-Chirurgical Society, vol. lxxxvii, to which paper I would refer you for further details.

Before concluding this subject, there is a condition we must consider which may ensue after the best regulated taxis, or even after the return of the bowel by operation. The longer the strangulation the greater is the probability of its occurrence, and so its possibility should be another deterrent to performing taxis beyond the limits previously laid down. When a loop of bowel has been considerably altered by pressure it must be borne in mind that normal peristalsis may not be re-established, and symptoms of obstruction will persist. The signs indicating this intestinal paresis will be progressive distension of the bowel

with gas, without any passage of flatus per anum; nausea succeeded by vomiting, or vomiting itself, will persist from the first. The pulse will be weak and rather quick, but in the early stage there will be no marked alteration in temperature or in rate of respiration. If this complication is not soon relieved the vomiting will be persistent, and the bilious-coloured fluid, becoming progressively darker, will be towards the end literally pumped up. Symptoms of collapse will become more marked, the pulse will increase in rate but decrease in force, the temperature will rise, and the respirations will be more rapid, owing to the increasing pressure on the diaphragm from the distended intestines. As these symptoms may take a very few hours to run their course, it is most important to recognize the condition promptly, and to act accordingly. The great point is not to be misled with the idea that the signs are due to some temporary peritoneal inflammation. Distinguishing features between the two are that in the parietic state the signs continue after reduction, the pulse has not the wiry character nor is there the pain, increased temperature, local tenderness, or rigidity which we might expect in peritonitis. It will also be noticed that although the bowels are distended there is an absence of visible peristalsis, such as would be observed with distension of the bowel on the proximal side of a hand.

FRACTURE OF THE FIFTH METATARSAL BONE.

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FRACTURES of the metatarsal bones due to causes other than direct violence are sufficiently uncommon to justify recording when a case presents itself. Direct violence is usually the cause of these fractures, and frequently involves severe damage to the soft parts, when the surgical consequences may be serious. If the fracture so caused is simple, and is recognized, the injury is of little importance if proper treatment be adopted. But when no violence has been received, and there seems little or even no cause for a fracture, the injury, being unsuspected, is liable to be overlooked, and the patient, instead of keeping at rest, walks about, partially disabled, suffering much pain for a long period. Such cases, according to von Bergmann, may ultimately cause permanent partial disablement.

A clergyman, about 50 years of age, whom I had attended for some years, consulted me on September 29th, 1906, for pain on the outer side of the right foot. He informed me that on August 10th, while walking on a gravel path and wearing ordinary shoes, he felt a sudden pain after he had been walking from twenty to twenty-five minutes. He had not twisted the foot, nor been jumping. Shortly afterwards he seemed to feel something slip at the site of pain, but felt no grating. The pain increased greatly in severity, and he reached home with difficulty. He was treated with lotions and partial rest under medical advice. Two or three days after the injury he had a slight attack of gout in the great toe of the same foot, but this soon passed off. He experienced no relief from the pain on walking till about five weeks later, when he bound his foot round with plaster.

I found over the base of the fifth metatarsal a distinct enlargement when compared with the other foot, somewhat painful on pressure, but hard and obviously bony. No crepitus could be felt. An x-ray screen examination disclosed a transverse fracture of the tubercular eminence at the base of the fifth metatarsal. The skiagraph showed marked separation of the fragment, with little or no attempt at bone union. On closer examination, after the x-rays had shown the nature of the injury, a very slight transverse groove could be made out over the site of the fracture.

The cause for such a fracture occurring without any violence in an apparently healthy man while simply walking is not very clear. The patient had never previously broken a bone; he showed no evidence of tabes or any other nerve lesion. Myeloid changes were as far as possible excluded by an examination of the urine. Mr. Eastes reported on a specimen that it "contained a most minute trace of serum albumen, but none of the tests employed showed the presence of albumose." In the absence of any inversion of the foot or any undue strain, it is difficult to believe that the action of a comparatively weak muscle, such as the peroneus brevis, would be sufficient to cause such a fracture.

The literature on the subject, as far as I have been able to discover, is very limited, the large majority of authorities briefly dismissing it with the remark that such fractures are due to direct violence. Tobold,¹ however,