LECTURES

ON

HERNIA AND ITS RADICAL CURE.

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LECTURE II.

Operation by the Subcutaneous Method.—Causes of Failure in the Operation.—Summary of Cases of Inguinal Hernia operated on for Radical Cure.—Successes and Failures of the Operation.—Table of ascertained Duration of Cure.—Number of ascertained Failures.—Hernia Complicated with Undescended Testis.—Transplantation of Testis into Scrotum.—Formation of "Tunica Vaginalis."

IN the subcutaneous method of operating, an incision is made in the upper part of the scrotum, where the tegumentary structures are so movable and elastic that the incision can, if necessary, be drawn upwards, so as to expose the superficial abdominal ring; and can be enlarged, if it be desirable to remove the sac, to an extent sufficient for this purpose. The length of this incision rarely exceeds, when tension is removed and the dartos has resumed its normal degree of contraction, one and a half to two inches. It will now be easy to detect with the finger the pillars of the superficial ring, the lower border of the internal oblique and transversalis muscles, the borders of the deep ring, the spermatic cord, and the outer edge of the rectus abdominis muscle. The finger can be passed into the deep ring, so as to raise forward the internal oblique and transversalis muscles, and feel internally the raised edge of the conjoined tendon.

The first material I employed in stitching up the canal was hempen thread, fastened over a wooden compress. This was used in seventeen cases. In the small cases of children, a pair of rectangular pins, similar to hare-lip pins at the point, but bent at a right angle near the other end, with a loop like that of a safety-pin, to lock into its fellow, were used (in forty-eight cases). Then stout copper-wire, silvered, was employed, with a view to prevent suppuration, and to afford a straight direction to the track, so as to drain the part effectually (in two hundred and forty cases). Latterly, I have used a stout piece of kangaroo, deer, or ox-tendon, well antiseptised in carbolic oil, and softened just before using by soaking in 1 to 40 carbolic lotion. The advantage of this is, that there is no necessity for disturbing the wound by removing the buried suture, as in the case of the wire and other methods.

All these modifications are essentially alike as regards the structures which were traversed and included in the suture. The variations in manipulation were merely those rendered necessary by the nature of the material employed for the ligature. When wire was employed, it was usually removed after a week or ten days. Hardly any discharge followed its use and withdrawal. The induration of the parts around and within the inguinal canal was usually marked, but its duration was not so long as in the case of the buried tendon suture. It was soon found that this induration, which was formerly considered by surgeons as important, did not remain as a permanent barrier against a return of the hernia. Such a barrier can only be obtained by a more intimate and extensive adhesion between the sides of the canal.

Operation by the Subcutaneous Method.—A tenotomy-knife, a semi-circular needle, mounted on a stout handle, flattened at the eye, with a sharp point and blunt shoulders, formed so as to slip along the front of the curved forefinger, with about a foot of tendon or wire as thick as stout twine, are the instruments necessary for the operation. If the sac is to be removed, a pair of blunt-pointed bent scissors will be useful, and a double hook or two to hold the edges of the wound apart.

The parts being carefully shaved and washed, together with the instruments and hands of the operator and assistant, with a 1 to 20 solution of carbolic acid, the hernia returned, the patient anaesthetised, and the spray (if considered important) in action, an incision with the tenotomy-knife, about three-fourths of an inch long, and oblique in direction, is made over the cord just below the pubic crest, through the tegumentary coverings down to the sac. A small artery—the external pubic—may require section and ligature at both ends with small catgut. The forefinger is then passed into the canal, carrying

the sac invaginated before it, up to the deep ring, behind the internal oblique and transversalis muscles, which can be felt and seen to be lifted up by the finger. At the inner border, the edge of the deep ring and conjoined tendon can be felt, and the finger passed behind them. Along the finger is then carried the needle, until its point can be felt behind these structures, through which it is then pushed. When its point raises the skin, the latter is drawn well over to the inner side before the needle is pushed through it. The tendon is then passed through the eye of the needle (or, if wire be used, a bend at the end of it is hooked on), and withdrawn with the needle through the scrotal puncture, and then detached. The finger is then passed behind Poupart's ligament, the spermatic cord felt for in its groove, and pushed aside. The point of the finger is then carried close to the ligament, and along the groove of the outer pillars of the superficial ring, opposite to the deep ring, the needle passed along it as before, and made to pierce the aponeurotic fibres. The skin is then drawn outwards, so that the needle can be passed through the same puncture as before. The other end of the ligature is then secured to it, drawn again through the scrotal puncture, and detached. The needle is then carried across behind the sac, between it and the cord. The latter can be isolated, as in tying the veins in varicocele, without difficulty. The inner end of the ligature is then connected with the eye of the needle, and drawn through. In a large case, especially if the rupture be a direct one, the needle is, lastly, to be passed through the end of Poupart's ligament, just above the pubic spine, and then carried through the inner pillar of the ring and triangular fascia, close to the os pubis, at the edge of the rectus muscle. The outer end of the ligature is then connected, and drawn across, so as to lace up the canal like a boot.

In the case of tendon-ligature being used, it is now to be braced up tightly, tied in a well secured surgeon's knot, cut off close, and buried in the wound.

If wire be used, a loop is left at the upper groin-puncture; the lower ends are twisted down into the scrotal aperture, the upper loop drawn upon so as to tighten the wire, and held firm by two or three twists down into the puncture. The bight of the upper loop is then bent downwards to meet the ends bent upwards; these are curved into the form of a hook to fasten on to the loop. A firm pad of lint is placed on the skin under the arch thus formed; and a broad spica bandage secures the whole, and exercises sufficient pressure to keep the wire firmly in contact with the hinder wall of the canal.

In wire-cases, no drainage-tube or antiseptic dressing is required. The wire acts as a straight and perfect down drain; the operation is subcutaneous, and the wound rarely even suppurates.

In the case of tendon being used, a drainage-tube should be placed, reaching from the superficial ring into the scrotal puncture, and the gauze dressing applied in the usual way by a double spica bandage, with a piece of jacquetette, through which the penis is passed, placed over all to keep off urine from the absorbent dressing.

After the scrotal opening be made larger, in order to remove the sac, some stitches should be placed pretty close together above the drainage-tube. In such a case the scrotal opening can be drawn up and stretched, so as to allow the needle to pass out and in through it, instead of through a separate groin-puncture. Thus the whole operation may be done through a scrotal opening of the length of two inches. The patient should be placed in bed in a half-sitting posture, in a bed-chair, with the knees drawn up over a bolster. Sometimes it is necessary to use the catheter a few times after the operation. Usually there is no need of this, and the patient is free from pain after the first twelve hours. To prevent pain altogether, a morphia suppository should be placed in the rectum just after the operation.

In a week or ten days, according to the amount of action, the wire may be withdrawn. By this time both the ends of the bent wire lie in the same wound-track. The lower twist is first untwisted, and the ends stretched by extension to efface the spiral twist. By traction upon the loop above, when the ends of the wire are cut off close below, the wire usually comes out in one piece. If there be any difficulty the loop may be divided, and the ends dealt with separately. The great advantage of using carbolic absorbent tendon is that this proceeding, somewhat painful, is avoided.

If this operation be properly done, it fulfils the following requirements for the permanent cure of inguinal hernia.

1. The deep ring and hernial opening are closed flush with the peritoneum, while the internal oblique and transversalis muscles, and the external oblique aponeurosis, are united to each other and to the deep hernial opening and mouth of the sac, so as to close, sustain, and support it against a fresh protrusion.

2. The conjoined tendon, forming the hinder or deep wall of the canal, is united to Poupart's ligament, close upon and over the

spermatic cord and twisted sac. Thus the valve action of the canal walls is restored, and the deep ring supported from below. The muscular and aponeurotic layers between which the canal lies are bound together by adhesion, where they had been separated by the hernia.

8. The pillars of the superficial ring are laced up like a boot, supplementing the weakened arciform fascia, supporting the other adhesions, and forming a third line of defence against a renewal of the protrusion. There is no permanent invagination of fascia after the purposes of the operation itself are fulfilled. The firm mass of the material which afterwards becomes apparent is composed of fibrinous effusion, which contracts and hardens like any other cicatrix. And this blending of the three layers of suture forms the barrier upon which the surgeon must rely.

Causes of Failure in the Operation.—The most common is failure to secure the sides of the deep ring by not planting the suture close to its edges. Here fear of damage to the deep epigastric artery acts sometimes to the disadvantage of the case. These vessels, however, are so loosely attached to the tissues, and so movable, as to be cut with difficulty in a puncture with a blunt shouldered needle. They slip out of the way, and, though doubtless they have been often included in the grasp of the ligature, they have never given rise to any trouble or secondary hamorrhage in the whole 414 operations. Next, the operator may fail to secure the conjoined tendon properly, or it may give way prematurely to the action of the ligature. Then, from fear of wounding the spermatic cord, the ligature may not embrace the tendon sufficiently closely, and may not be passed deeply enough through Poupart's ligament. The hernial groove here formed may not be included in its grasp, so the hernia may again creep along the unclosed canal. Then the pillars of the superficial ring may not be closely and continuously united along their whole length to each other and to the triangular fascia. Lastly, adhesions formed when the patient is in a feeble state of health, or in a permanently lax and weak condition of the aponeurotic structures, may yield and give way, as they may do in other operations for prolapse of any kind, by repeated and constant stretching. In such cases, a preventive truss will be afterwards required.

Sources of Danger in the Operation.—In the first place is the possibility of a puncture or wound of the bowel in placing the deep sutures. By keeping the needle upon the front of the curved finger, placed in the proper position, this can be easily avoided. In point of fact, this accident has not once happened in my own hands. Next, it is possible that the femoral or iliac vessels may be damaged. By placing the finger in front of the vessels, and lifting up Poupart's ligament well from them, I have avoided this accident. It has never occurred in my hands. Nor, as before mentioned, has any trouble arisen from the epigastric vessels. The cord may be damaged, and the spermatic duct included in the ligature or obstructed by its pressure. In two cases out of 414 the testicle has become atrophied; in one, in consequence of the pressure of a steel clamp to the ends of the wire, and in another from an abscess forming in the gland. In two others, being found atrophied, it was intentionally removed in the operation.

Summary of Cases of Inguinal Hernia operated on for the Radical Cure.—I will first take the cases of reducible hernia, which, for some years, were the only class of cases upon which I deemed it advisable to operate for the radical cure.

In my earlier attempts, stout hempen ligature thread was used, applied subcutaneously, and secured over a compress. Of these, there were seventeen cases, with one death from pyæmia.

The pin-operation was chiefly done on infants and children with large uncontrollable ruptures. Of these, there were forty-eight cases, one a double operation, making forty-nine operations, with two deaths from erysipelas and peritonitis; the last was set up by the pressure of a strong truss just before the operation upon a knuckle of bowel, which was found, after death, to be the focus of inflammation on the opposite side of the abdomen. This was published in the BRITISH MEDICAL JOURNAL at the time.

The subcutaneous wire operation was performed in two hundred and fifty-two cases, of which nine were double operations (on both sides), and eleven were second operations (the first not having succeeded). With these, the number of operations, as distinguished from cases, was two hundred and seventy-three.

Two hundred of these were done consecutively, without a single death or unpleasant symptom. In all these cases, the sac was not removed, but transfixed in several places, twisted, and tied firmly. The cases were selected mainly from young male adults, or adolescents, in good health, which may partly account for the singular immunity from serious symptoms in two hundred consecutive cases. Five of

them only were females, all young adults or children. Out of the whole two hundred and seventy-three, there were four deaths, one from tetanus, one from delirium tremens, and two from bronchopneumonia.

The mortality in these three variations of the operation, taken together, was seven deaths out of three hundred and thirty-nine operations, or about 2 per cent., and half of them were from hospital causes, some of which have been, of late years, entirely abolished. Taking the wire operations alone, there were two hundred and seventy-three, with four deaths, about 1½ per cent., none of which could be strictly attributed to the special conditions or results of the operation.

The Successes and Failures of the Operation.—In an operation of this kind, there are special difficulties in estimating and ascertaining the proportions of failures to successful cases. A certain proportion of the failures can be verified by the patients returning for further aid to the surgeon.

If the operation be imperfectly performed, the failure becomes manifest before the patient leaves the care of the surgeon, and can be noted. But in a considerable proportion of hospital-cases, the patient does not reappear after the first convalescence. My experience is that he is more likely to come back, if the operation be unsuccessful, in search of further relief. However carefully the addresses of hospital-patients may be kept, their wandering habits and frequent removals render it impossible to keep them in view, and to follow up the cases, for many years.

I have found that, in the greater proportion of the failures, the rupture returns before the end of the first year. When the operation is properly done, but the weakness of the abdominal structures inherent in the patient's tissues results in a slow yielding of the parts, and the formation of a fresh sac, the rupture may not become apparent until some time during the second year.

It has often been the custom of surgeons, too anxious for the appearance of success, to set down and put forth as cures cases which have been examined only a few weeks or months after the operation. The shortsightedness of placing the operator's reputation upon such a foundation has often struck me, and to avoid it I have, in the list which my hearers have placed before them of the results of ninety-six successful cases (furnishing ninety-eight operations), after subcutaneous operation, carefully excluded all cases which have not been verified two years after the operation.

It will be seen in the last column of the table that the first case has been watched and examined in public during a period of not less than twenty-five years. Two cases have been in view for 23 years (one of these cases is present to-day for examination) one for nineteen, another for seventeen, three for sixteen, and so on, down to four years' duration. Of the last there are eleven cases; of three years' duration twenty-one cases, and of two years upwards twenty-four cases. The dates of operation and of the time of the latest examination of the patients, or of hearing of them from competent authority, are given in the fourth and fifth columns.

It should be mentioned that No. 49 in the table was a case in which the omentum, though not adherent, could not be returned, while No. 73 was complicated with undescended testes. Both were wire cases, in which the sac was not separately ligatured.

It may also be pointed out that No. 6, after seventeen years without truss, by falling downstairs with a load of bacon on his back, ruptured himself again on the same side. This can scarcely be considered in any other light than as a fresh and distinct rupture, which would have occurred even if the side had never before been ruptured. Nos. 26 and 27 were double ruptures, both operated on successfully at about the same time, and counting really as two more successful operations to be added to the ninety-six, making ninety-eight in all. Nos. 10 and 47 were enormous uncontrollable ruptures, each operated on three times before a completely successful result ensued, the size of the rupture being diminished by each operation. No. 47 was in a child of seven years, and the return was mainly caused by violent crying. Five cases have been, since the cure, in service in India, the relaxing climate of which is highly unfavourable to rupture-cases. Three cases passed, after the operation, the medical examination for the army, and one for the navy, after being before rejected for rupture.

The ninety-six cases thus tabulated are those in which the operation, therefore, was found to be permanently or durably successful, and entitled in every sense to be considered as "radical cures." Out of the total number of cases of the same class, viz., 339, there are 152 others which have been examined at periods under two years from the time of the respective operations, and found satisfactory. Fifty-nine were found on after examination to be more or less failures in the intention of producing a radical cure. Most of these, however, were improved by the operation, and a truss was made available which had

Table of ascertained duration of Cure after WOOD'S Subcutaneous Operation for the Radical Cure of Reducible Inguinal Hernia.

No.	Initials of Name.	Age.	Date of Operation.	Date when last seen or heard of.	Truss worn or not.	Duration of Cure, about years.	Remarks.
1	H. H.	22	Oct. 6, 1860	Jan. 5, 1885	No.	25	Shown frequently at King's Coll. Hosp., and Royal Med.-Chir. Soc.
2	J. B.	25	Jan. 11, 1862	Feb. 14, 1885	No.	23	Shown frequently at King's Coll. Hosp., and Royal Med.-Chir. Soc.
3	H. C.	28	Feb. 28, 1862	Jan., 1885	Light tr.	23	Indian service.
4	R. S.	30	Mar. 24, 1864	Mar. 5, 1885	No.	21	
5	H. W.	30	Nov., 1864	Jan., 1885	Light tr.	19	
6	H. M.	25	June 25, 1869	Nov. 20, 1877	Light tr.	17	Fell down stairs in Nov. 1877, and ruptured himself again same side after 17 years [without truss.
7	H. H.	16	June 20, 1859	July 16, 1877	Light tr.	17	Wears truss at hard work; engine fitting.
8	C. C. T.	19	June 5, 1865	July 16, 1881	No.	16	
9	H. W.	26	June 21, 1865	April 30, 1881	Occasion.	16	Seen again quite recently.
10	F. H.	25	Nov. 8, 1871	Mar. 5, 1885	No.	14	Operated on three times; pilot.
11	M. B.	5	Oct., 1864	Dec., 1877	No.	13	
12	G. T.	15	Oct. 5, 1861	Dec. 9, 1874	No.	13	
13	W. A.	5	Oct. 6, 1864	Oct. 9, 1877	No.	13	
14	A. H. B.	50	Oct. 20, 1867	May 16, 1880	Light tr.	13	Heard from by letter.
15	C. T.	18	June 28, 1862	April, 1874	No.	12	Seen many times.
16	M. S.	8	Nov. 14, 1872	Oct., 1884	No.	12	
17	J. B.	17	June 29, 1859	Oct. 5, 1870	No.	11½	
18	Capt. G.	24	June 6, 1872	Dec. 6, 1883	No.	11	Been in India 8 years, riding hard.
19	J. C.	25	April, 1858	Oct. 20, 1868	No.	10½	Died of phthisis; no return up to death.
20	T. L.	18	Sept. 5, 1863	May 6, 1873	No.	10	
21	D. W.	34	Sept. 5, 1862	June 10, 1872	No.	9	
22	A. P.	22	July 5, 1876	Jan. 15, 1885	No.	9	India; wears truss when riding.
23	W. R.	19	May 31, 1862	Jan., 1870	No.	8	
24	G. H. F. J.	28	Oct. 19, 1872	Mar. 5, 1880	No.	8	
25	L. E.	26	Feb. 13, 1877	Oct., 1884	Light tr.	7	Double, both sides operated on.
26	J. P.	19	Mar. 30, 1878	Feb. 10, 1885	No.	7	Double, both sides operated on.
27	Lieut. D.	26	Mar., 1866	Jan., 1873	No.	7	Heard by letter.
28	T. N.	7	July 4, 1863	Dec. 28, 1869	No.	6½	
29	G. N.	9	Oct. 3, 1863	Dec. 28, 1869	No.	6	
30	H. C.	20	Oct. 5, 1866	Nov., 1872	No.	6	Died of consumption; no return up to death
31	G. R. A.	26	June 19, 1868	Sept., 1874	No.	6	Died of gastric fever; no return.
32	A. H.	22	Feb. 9, 1878	Jan. 25, 1884	No.	6	
33	J. P. N.	24	Dec. 13, 1870	April 5, 1876	Light tr.	5½	
34	G. V.	21	June, 1860	Oct., 1865	No.	5	
35	W. B.	32	Mar. 12, 1862	May 1, 1867	Light tr.	5	
36	W. A.	24	Oct. 3, 1862	Nov. 1, 1867	No.	5	
37	G. R. B.	7½	Nov. 28, 1878	Feb. 22, 1883	No.	5	
38	E. W. B.	50	Oct. 22, 1879	June 10, 1884	No.	5	Examined after return from India.
39	E. P.	3	June 2, 1877	June 10, 1882	No.	5	Very large scrotal.
40	Lieut. H. L. C. L.	30	Mar. 12, 1878	Sept. 24, 1883	Riding tr.	5	India; examined after return.
41	J. H. L.	4	June 22, 1871	Oct. 20, 1875	No.	4½	
42	J. D.	1½	Aug. 21, 1862	Oct., 1866	No.	4	
43	J. A. T.	36	Oct. 5, 1872	Feb. 24, 1876	Light tr.	4	Very large scrotal.
44	E. B.	5	Dec. 20, 1873	Jan. 14, 1877	No.	4	Did.
45	E. B.	12	Nov. 28, 1863	May 8, 1867	No.	4	Female, right inguinal, congenital.
46	F. B.	10	April 17, 1879	June 2, 1883	No.	4	Passed Navy Medical Examination.
47	G. D.	7	June 24, 1862	June, 1866	Light tr.	4	Enormous congenital; operated on three times.
48	M. H.	40	Nov. 9, 1881	Jan., 1885	No.	4	Omentum and sac removed.
49	R. M.	27	Oct. 1, 1880	Mar., 1884	No.	4	Irreducible; omentum and sac removed; large.
50	C. D.	4½	June 28, 1862	June, 1866	Light tr.	4	Operated on twice; very large congenital.
51	M. L.	34	Feb. 28, 1881	Jan., 1885	No.	4	
52	Capt. C.	35	Mar. 20, 1864	April 1, 1867	Light tr.	3	Ruptured other side by fall from horse, hunting.
53	A. B.	30	Aug. 6, 1881	June, 1884	No.	3	Sac and omentum removed.
54	J. C.	18	April 6, 1867	May, 1870	No.	3	
55	M. E.	18	Jan. 12, 1881	July 24, 1884	No.	3	Passed Army Medical Board.
56	P. S.	8	Nov. 10, 1880	Oct., 1883	No.	3	
57	J. D. R.	1½	Aug. 5, 1881	Dec. 3, 1884	No.	3	
58	C. K.	8	April, 1876	June 20, 1879	No.	3	
59	J. S.	22	May 18, 1872	June 30, 1875	No.	3	
60	W. S.	22	Mar. 20, 1862	July 9, 1865	No.	3	
61	G. J.	18	Dec. 1, 1869	Dec., 1872	No.	3	
62	M. D.	18	Jan. 6, 1874	Jan., 1877	No.	3	
63	C. D.	4½	Jan. 28, 1862	Oct., 1866	No.	3	
64	S. B.	26	Feb. 27, 1864	May 26, 1867	No.	3	
65	R. H.	30	July 12, 1862	June, 1865	No.	3	Heard of.
66	D. S.	21	July 2, 1865	May, 1868	No.	3	
67	J. P.	19	Dec. 30, 1865	July 10, 1868	No.	3	
68	J. A.	19	Nov. 1, 1862	Dec., 1865	No.	3	
69	W. B.	19	Nov. 10, 1880	Dec., 1883	No.	3	
70	M. E.	18	Jan. 12, 1881	July 24, 1884	No.	3	
71	P. S.	8	Nov. 10, 1880	Oct., 1883	No.	3	
72	J. W. R.	1½	Aug. 5, 1881	Dec. 3, 1884	No.	3	Very large congenital scrotal; uncontrollable.
73	A. J.	13	Feb. 19, 1882	Nov. 21, 1884	No.	2½	Undescended testis put into scrotum.
74	J. P.	18	Oct. 19, 1861	Jan., 1863	No.	2	
75	U. B.	37	July 9, 1881	Nov., 1884	No.	2	
76	M. B.	28	May 1, 1882	June, 1884	No.	2	Passed Medical Examination for India.
77	M. C.	20	Nov. 12, 1874	Dec., 1876	No.	2	Cornet-player.
78	J. E.	27	April 30, 1881	Mar. 18, 1883	No.	2	
79	G. H.	9	July 4, 1871	Oct., 1873	No.	2	
80	A. S. H.	35	May 9, 1870	Dec., 1881	No.	2	
81	H. H.	18	Dec. 7, 1881	Nov., 1883	No.	2	Heard of as quite cured.
82	A. G.	6	July 31, 1883	Feb. 10, 1885	No.	2	
83	J. K.	10	April 10, 1883	Jan. 5, 1885	No.	2	Other side weak; wears light double truss.
84	A. L.	18	Dec. 16, 1882	Oct. 13, 1884	No.	2	
85	J. E. M.	21	April 3, 1882	June 1, 1884	No.	2	Passed Army Medical Examination.
86	Mrs. P.	30	Oct. 5, 1878	June 21, 1880	No.	2	Mother of child also operated on.
87	A. C. R.	26	Mar. 20, 1880	May, 1882	No.	2	Heard of from another patient sent by him.
88	K. R.	10	Mar. 19, 1882	May 20, 1884	Light tr.	2	
89	L. S.	2½	Oct. 19, 1861	Oct. 2, 1863	No.	2	Very large congenital.
90	G. S.	20	July 11, 1883	Mar., 1885	No.	2	Slight bulge after operation.
91	J. W.	20	May 1, 1880	Dec., 1883	No.	2	
92	J. W.	7	April 6, 1880	Feb. 3, 1883	No.	2	Large congenital.
93	A. W.	22	Feb. 16, 1881	Oct. 9, 1883	No.	2	
94	A. B.	30	Nov. 25, 1876	Oct. 15, 1878	No.	2	
95	W. A.	85	Oct. 6, 1872	Jan., 1874	No.	2	
96	C. S.	21	May 18, 1878	Nov. 7, 1880	No.	2	

not been so before. None of them were made worse by the operation. The remaining cases have not been seen or heard of since their discharge from the hospital.

The number of successful operations out of a total of 339 (those of above and under two years' duration at the time of last examination taken together, as I think may fairly be done) is therefore 248, while the number of ascertained failures is 59. This result gives about 73 per cent. of successful cases; and it is reasonable to suppose that the same proportion may be maintained in the cases of which the result is unknown at the present time.

If we compared the ninety-six cases, or ninety-eight operations of known successful results, with the fifty-nine cases of ascertained failures, in order to obtain our percentage. By submitting to this we should still obtain nearly two-thirds of successful cases. And this notwithstanding that the ninety-six cases, or ninety-eight operations, are only reckoned from those of over two years' standing, while the fifty-nine cases chiefly became unsuccessful before the end of the first or in the second year, during which period the majority of the failures declared themselves. If from the total 339 we deduct the earlier cases of thread, and compress, and pin operations (73 in number), and take only the results of the improved operation, we obtain 82 per cent. of successful cases.

Spray and Antiseptic Cases.—In twenty-eight cases of inguinal hernia, the operation was conducted under the spray, with antiseptic gauze-dressings. The sac was tied at the neck with separate stout catgut, and removed; while the sides of the canal and rings were drawn together by kangaroo or ox tendon, or wire. All the cases were large and severe. Sixteen were reducible; and of these one died of broncho-pneumonia, with some *post mortem* signs of septic infection. The man was a marine engineer, aged 26, who had served long on the coast of Africa, and had fever several times. He was a bad subject for operation, but was completely incapacitated for his work and livelihood by a large and uncontrollable rupture. Twelve were cases of irreducible hernia from adhesions, etc., all severe, many very painful and tender. Of these, two died. One, aged 45, was operated on during a very foggy and severe winter, and died of broncho-pneumonia. The rupture was large, adherent, and painful. He begged earnestly for the operation to be done for his relief. The other fatal case was complicated with a cystic growth on the spermatic cord and epididymis, which was removed with the sac. His aged was 56, and he had come from the Cape to have the operation done. He was warned of its severe nature, but had suffered so much from its unmanageable nature and misfitting trusses, that he was incapacitated from both work and enjoyment. He died from pneumonic congestion and bronchitis. No failures to cure have hitherto resulted from this operation; but the percentage of fatal cases is considerably increased, in comparison with the more strictly subcutaneous method, in which the sac was not removed. No doubt this is partly the consequence of the greater severity of the cases, as well as of the operation. Three deaths out of twenty-eight cases gives about 11 per cent. of fatal cases, as compared with $1\frac{1}{2}$ to 2 per cent. Four males and two females have been operated on more than two years, and have shown, on examination, no signs of a return. In six other cases, males, the results have not been tested or verified since the operation. Twelve males and three females have been cured for a period not yet reaching two years.

The mortality agrees fairly with that obtained by Tilanus, of Amsterdam—namely, about 11 per cent.—in his collection of one hundred Continental cases of the radical cure of hernia by the open method of operation by dissection, with and without the use of the more strict antiseptic precautions. If this death-rate be found to be maintained on further experience, it seems somewhat too great a general risk for an operation of the class to which that for the radical cure of hernia belongs—namely, that of expediency. In the collection of cases made by Dr. Israelsohn, and given by Professor Annandale, of Edinburgh, out of seventy-one cases, four of the patients died, while sixty-six were cured, the operations being performed by various surgeons, but all with strict antiseptic precautions. This points to a further improvement to be obtained by the careful carrying out of antiseptic precautions.

Hernia Complicated with Retained Testis.—These cases are invariably of the congenital variety of hernia, and are often accompanied by other morbid conditions, such as adhesions and intrasaccular obstructions, or strangulations. When orchitis or epididymitis has been present, which is not unfrequently the case, especially if a truss have been worn, or injury sustained, very difficult complications may ensue. In two cases the testicle was retained in the abdomen, and could not be felt or reached by opening up the canal. The patients were young adults who had worn trusses for some years, with much pain and discomfort, and without effect, in keeping up the rupture. When the

testicle was drawn down by the descent of the bowel (to which it was in all probability adherent in the iliac fossa) the truss could not be worn at all, and much inconvenience ensued from the presence of the testis in the deep ring. Under these circumstances, the canal was closed up to the deep ring by the wire suture, the neck and fundus of the sac being tied and removed. One of these was operated on a second time, the first operation having failed. The ultimate result was the comfortable wearing of a light truss. In another case the hernia became acutely strangulated, and necessitated immediate operation. On opening the canal under spray there were found two deep hernial openings, one placed internally and filled up by protruded and adherent omentum, and the other, externally, was occupied by a knuckle of strangulated intestine, lying along and over the cord, and adherent to a very small and shrivelled testicle. The testicle was removed, the spermatic artery tied with catgut, and the omentum and double-necked sac also tied separately and removed flush with the peritoneum. The canal and superficial ring were then wired up with a small drainage-tube placed along it. The patient did extremely well under the gauze dressing, and recovered in a short time with a bulgy groin, produced by that deficiency in the development of the internal oblique and transversalis muscles to which I have before alluded. He wears now a light truss for supporting the weak parts.

In six other cases the testicle was by an open incision freed from its adhesions and abnormal attachments in the canal and rings. In all of them the cremaster muscular fibres were wasted or absent, and the adhesions were united with its connecting fascia and the conjoined tendon, and with the fascia propria, and in two cases with the inter-columnar fascia. In these two last cases the testicle lay in the superficial ring upon the crest of the os pubis. In all of these six cases the congenital sac was formed, as is usual, by the tunica vaginalis, which, with the globus minor of the epididymis, was drawn down below and in front of the testicle. In three of them the epididymis was spread out and drawn down below the testis in a manner illustrative of the action of the gubernaculum; which, attached mainly to the epididymis and peritoneum, caused these structures to precede the adherent and delayed testicle in its descent.

By separating the adhesions carefully and removing the adherent omentum when necessary, the testicle could be cleared, and the spermatic cord examined and freed from adhesions. The cord was then carefully stretched by being pulled forwards and outwards, and then slipped down into the upper contracted part of the imperfect scrotum, previously dilated by the introduction of the finger, and freely stretched like a glove, until it was large enough to hold the testicle. A thick silk or tendon ligature was then passed through the hinder and lower part of the scrotum by means of an ordinary curved suture needle, or a handled needle. Then it was made to pass through the fibrous tissues in close contact with the testicle and spermatic duct, and out again through the scrotum, about an inch distant from the first puncture. The ends of the ligature were then tied over a carbolised pad of the size of the end of the thumb, at the bottom and back part of the scrotum.

In three cases, the spermatic cord was found to be too short and resisting to be placed, without great tension, in the scrotum. To overcome this difficulty, I carefully dissected with the point of the scalpel, through the connective tissue attaching the testicle to the globus major, as far down as to enable me to turn the testicle upside down, with the lower part of the epididymis and globus minor still attached to the testicle. By this means, I gained the length of the testicle (about one and a half inches), which, without further strain, lay topsy-turvy in the scrotum, the cord and epididymis being above it. A drainage-tube through the bottom of the scrotum, and the use of the spray and careful dressing with gauze, resulted in perfect success.

In one or two cases, the testicle showed a disposition to ascend as far as the root of the scrotum by subsequent contraction, but remained placed out of the way of injury below the penis, between its root and the origin of the adductor longus muscle. In none of these cases has the testicle been found to waste since the operation, and this must be attributed to the care with which the deferent vessels, passing from the epididymis to the testicle, and the numerous small branches of the spermatic vessels proper, were treated and arranged.

I have transplanted the testicle in this way in six cases in which no hernia was apparent. In one of them, a little child, the testis, after a few months' interval, was not to be found, and had either atrophied or reascended into the canal. In the cases in which the upper opening of the scrotum was wide, a stout tendon or catgut buried suture, placed across it when the testicle was lodged in the scrotum, assisted in keeping it there. This could usually be felt, for many months after the operation, as a distinct ridge above the testicle.

In two cases a hernia appeared in the inguinal canal after the

testicle had been transplanted for some months. These had either been overlooked at the time of the operation, or had formed subsequently. In one, the operation for the radical cure was subsequently performed, and the other still wears a truss, with a pad of the shape of a horse-shoe pressing on the canal, the breadth of the pubic bone intervening between it and the transplanted testis. Since these cases occurred, I have made it a rule, if the canal be patulous when the testis is transplanted, to put tendon-sutures to its sides and rings, as in the subcutaneous operation for the radical cure, feeling the great probability that a hernia will follow the testicle along the funicular process into the hollow made by it during its retention in the canal.

In all these cases, the stretching and the detachment of the vas deferens and epididymis from the testicle, were much facilitated by the loose unravelment—a spreading out which the epididymis and tissues had undergone by the continuous traction of the gubernaculum since the fetal period. In several, the epididymis was pulled to a considerable distance from the testicle.

In the cases in which the open and dilated funicular process, which forms the sac in congenital hernia, was long enough to permit it to be brought down into the scrotum, the fundus was utilised to form a tunica vaginalis, by being detached from the neck of the sac, and stitched up with a glover's suture of thin catgut, on a level with the top of the testicle. The intervening neck of the sac, from this point to the deep ring, was then detached, tied with a double ligature of tendon or catgut, flush with the deep hernial opening, and removed altogether. In some of the cases, a twist or two was given to the neck of the sac before the ligature was applied and the sac removed. In one case, where the gland was evidently atrophied, flabby, and little more than fibrous connective tissue, the testicle was entirely removed. With this exception, and the case of strangulation before described, the testis was preserved, and the result as to the rupture was even more satisfactory than where the gland was removed.

ABSTRACT OF LECTURES

ON

SOME OF THE INJURIES AND DISEASES OF THE HEAD AND NECK, THE GENITO-URINARY ORGANS, AND THE RECTUM.

Delivered at the Royal College of Surgeons of England.

By EDWARD LUND, F.R.C.S.,

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LECTURE II.—SOME INJURIES AND DISEASES OF THE BLADDER AND GENITO-URINARY ORGANS.

IF there be one condition of the bladder which will give a surgeon especial annoyance and distress, it is when he discovers that, either from some fault of his own, from careless nursing, or from ignorance of those in attendance on the patient, he has to deal with a case of extreme distension of the bladder with overflow, which has been overlooked. A practitioner, a few years since, consulted the lecturer about a young lady, who, he believed, required paracentesis. Six days previously, she had caught cold; and he found her, on the next day, feverish, with abdominal tenderness. Her urine was slightly albuminous, and was beginning to pass from her involuntarily; the abdomen was much distended. Renal disease was suspected. The lecturer, on examining the patient, detected a circumscribed fluctuating tumour in the abdomen, but menstruation had been regular. He found that, directly after the chill, there had been pain in micturition, with scanty passage of urine, and therefore introduced a catheter. Seven pints of dark-coloured and slightly ammoniacal urine were removed, and the patient quickly recovered. In a second case, where the patient was a man aged 60, the lecturer was called to see what was said to be a tumour in the pelvis pressing on the rectum, and causing abnormal symptoms. There had been tenesmus following prolonged difficulty in defæcation; and abscess, bursting into the bowel, had been diagnosed. The patient had been under observation for three weeks; at the end of the first, a swelling had formed on the left side of the pelvis; this increased steadily. There were evidences of prostatic disease. The lecturer passed an ordinary screw-up silver catheter

(not having a prostatic instrument at hand), and a quart of urine was drawn off, the tumour in the left of the pelvis disappearing. The prostate was enlarged and tender, pressing on the rectum so as to obstruct some scybala. The urgent symptoms soon disappeared on careful attention to the bowels and bladder. In a third case of this class, an elderly but robust gentleman, a foreigner, was seized, when at work in his office, with giddiness, followed by severe rigors and profuse perspiration. Similar symptoms, but not so severe, had occurred before. He went to bed and was sick; the abdomen was distended, and hernia was suspected. He had recently passed great quantities of urine, but always with some difficulty. The lecturer passed a vulcanised India-rubber catheter, withdrawing nearly five pints of urine. In a few days, the symptoms recurred, and were relieved in the same manner, and the patient ultimately did well, when regular catheterism was enforced. His ignorance of the English language and his corpulence had made his case troublesome through the difficulty from which he suffered in expressing subjective symptoms, and which his attendants experienced in examining the abdomen. No surgeon should ever stir without a male elastic catheter.

Mr. Lund then spoke in favour of puncture of the bladder above the pubes. It is cleaner than rectal puncture, and an instrument can be better retained. Having ascertained that the bladder is really full, and not suddenly empty through changes caused by secondary renal disease, the lecturer uses for the purpose a trocar and cannula of special form, just long enough to secure its entrance into the bladder, and with the cutting end of the trocar so fashioned that it will make a lineal vertical, and not a triangular cut, which is then stretched into a circular form by the progress of the instrument. The cannula is made large enough to permit the passage through it, on the withdrawal of the trocar, of a vulcanised India-rubber tube, which can lie smoothly in the bladder, and to which can be firmly fixed a plate or shield moulded to the curvature of the abdominal wall, and there retained by elastic bands. The bladder will tolerate the presence of such a tube without pain or inconvenience for a long while. In one case, where suprapubic paracentesis was performed on a patient subject to retention from an extremely fine stricture, internal urethrotomy was effected five weeks later, the intervening time being occupied by dilatation of the urethra from a condition almost impervious to one sufficient to permit the passage of a guide bougie in advance of the urethrotome. In another case of greatly distended bladder, from large swollen prostate, which resisted all attempts at catheterism, the lecturer punctured above the pubes, and the tube was worn for thirteen weeks, the patient going to and from his business by railway. Eventually the tube was removed, the resulting sinus closed; and he can now empty his bladder very satisfactorily, although a flexible catheter is passed occasionally to measure the quantity of retained urine, and to note how far it preserves its healthy acid reaction. In the suprapubic as in rectal puncture, the sinus heals readily. The only practical objection urged against suprapubic puncture is, that the opening is not so favourably placed for the drainage of the bladder as when the rectum is tapped. Assuming the patient, after the operation, is to remain always upon his back, there is great force in this objection. But with the suprapubic puncture it is not difficult to set up an arrangement of elastic rubber tubing on the siphon principle, which will drain off the urine so completely as to leave the bladder practically dry. Or, if the patient lie on his side, the drainage can still go on, the instrument being safe from injury. Moreover, the bladder is not punctured near to its most sensitive part, as by the rectal operation, but on its anterior wall, where it is endowed with the least amount of sensibility. There is another method of puncturing the bladder in prostatic retention recommended by Mr. Reginald Harrison, of Liverpool, in which, without any preliminary incision, he drives a long trocar and cannula through the perineum and the prostate gland until the bladder is reached. This instrument being replaced by a silver tube, the latter can be borne easily by the patient, and forms a ready means of emptying the bladder, to his immense relief. Mr. Harrison's observations lead to the conclusion that direct puncture of the prostate gland may subsequently induce atrophy and general wasting of that organ, and so ultimately restore to the prostatic portion of the urethra some of its normal capacity. It is the possibility of such a result following upon Mr. Harrison's operation that has led the lecturer to watch, with great interest, how far extended experience shall confirm this idea.

The lecturer then spoke in favour of circumcising an infant whenever the prepuce "balloons out" whilst urine is passing. In such a case, there is always a risk of inguinal hernia being produced through straining during micturition. When this complication already exists, there comes the trouble of getting a suitable truss for an infant. Mr. Lund prefers the little known worsted truss, which he described at