

Recurrent Inguinal Hernia

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An analysis of 584 operations for recurrent inguinal hernia was made in an attempt to determine the cause of the recurrence based on the anatomic findings. The recurrence was indirect in 300, direct in 241, and various other in 43 operations. The causes of the indirect recurrences appeared to be an unrecognized hernia, incomplete dissection or improper ligation of the sac, failure to narrow the cord, or inadequate reconstruction of the internal ring. No cause for the diffuse direct recurrences was apparent. Of the 241 hernias in Hesselbach's triangle, 144 were small localized defects, usually (112) just lateral to the symphysis. These were considered to be caused by the cutting action of a suture placed under tension. On the basis of these findings, suggestions are made for primary inguinal hernia operations.

THE PURPOSE of this study was an attempt to determine the cause of the recurrence on the basis of the anatomic findings at operation. The objective was partially met; in the majority of patients, the cause could be identified or at least inferred. In some patients without an evident reason for recurrence, no satisfactory explanation could be offered.

Summary of Patients

The age of the 522 patients, all male veterans, is shown in Table 1. The interval from the last operation to the time of recurrence is shown in Table 2. The recurrence was within 5 years in 55.5%, within 10 years in 74.8%, and from 11 to 47 years in 25.2%. A total of 584 operations was performed in the 522 patients. The right side was involved in 60% and the left in 40%. Bilateral repairs had previously been performed in 155 patients; the recurrence was bilateral in 29, on the left side in 56, and on the right in 70 patients. The recurrence was the second in 42, the third in 19, the fourth in nine, the fifth in two, and the sixth in one. Five patients gave a history of prior wound infection.

In eight patients, the hernia was incarcerated requiring prompt operation: six were indirect, one direct, and one femoral. No bowel resection was necessary.

The findings at operation were an indirect hernia in 300 (51.4%), direct hernia in 241 (41.3%), and various other in 43 (7.3%). The details are shown in Table 3. In 234 of the 300 indirect recurrences, the peritoneal sac extended down within the cord for a variable distance, as

in a primary indirect hernia. Usually no evidence of a purse-string or ligature could be identified, although in some patients remnants of suture material were seen displaced on one wall of the sac at about the level of the internal ring. Similarly, a moderate circumferential scar was occasionally found, suggesting the site of the purse-string suture. An additional 33 patients had a sliding hernia, occurring twice as frequently on the left as on the right. In another 33 patients, the peritoneal protrusion was lateral to the epigastric vessels, adjacent to the cord at the internal ring but not extending into the spermatic cord. A consistent finding in all indirect hernias was a V-shaped fascial defect in the medial aspect of the internal ring. The extent of the defect was directly related to the size of the hernia. In the very large hernias, the defect extended nearly to the symphysis, displacing the epigastric vessels proportionately.

Ninety-seven of the 241 direct recurrences were a diffuse bulge in Hesselbach's triangle. The remaining 144 were localized defects, most often (112) just lateral to the symphysis. These were remarkable for the small size of the fascial defect, usually a transverse slit, through which a considerable mass of preperitoneal fat, and frequently peritoneum, protruded. In an additional eight patients with obvious indirect recurrence, a localized medial defect was present.

The remaining types of recurrence shown in Table 3 require no description, except for the recurrence of the seven patients with a complete breakdown in the direct area. The inguinal ligament and adjacent transversalis fascia were essentially absent; the superior extent of the defect varied, although usually the aponeurotic edge of the internal oblique and transversus could be identified.

The repair of the recurrent hernia depended on the type of recurrence and the remaining structures available. Essentially, the following principles were observed: (1) The inguinal region was completely dissected, in normal tissue planes where possible. (2) The cord structures, cremaster and fascia, occasionally atrophic, were more often hypertrophied and required partial excision to narrow the cord. Laterally, the cremaster division was followed by suture ligation of the external spermatic vessels. (3) A

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TABLE 1. Age on Admission: 522 Patients

Age	Number	Per Cent
20-29	22	4.2
30-39	64	12.3
40-49	101	19.3
50-59	151	28.9
60-69	116	22.2
70-79	57	10.9
80-89	9	1.7
90+	2	0.4

high ligation of an indirect sac was obtained; the direct sac was usually ignored or enfolded. (4) An adequate inferior layer of the transversalis fascia was sutured to the superior edge of transversalis fascia; this suture line was started close to the symphysis and continued laterally to avoid tension at the internal ring. (5) A snug closure was obtained at the internal ring. (6) The aponeurotic edge of the internal oblique was sutured to the inguinal ligament as reinforcement. (7) For the direct hernia with deficiency of the inferior transversalis fascia, Cooper's ligament was employed in the repair. For these, a relaxing incision was made. (8) For many of the small localized direct recurrences, a strong fascial edge could be identified around the neck of the sac; only a few sutures were needed to close the opening. (9) In any repair where tension was evident, a relaxing incision was made. (10) Orchiectomy was avoided if possible (five in this series) and prosthetic mesh was not utilized.

The postoperative complications were as follows: wound infection 7, hematoma 7, required transurethral resection 2, thrombophlebitis 2, atelectasis 2, acute cholecystitis 1, and myocardial infarction 1. No deaths occurred.

Discussion

The largest series of operations for recurrent hernia has been reported from the Shouldice Hospital. In 1964, Glassow¹ recorded 2910 operations, the type of recurrence being indirect in 1136, direct in 1270, mixed in 335, and femoral in 169. In 1976, Glassow² reported the recurrent hernias he personally had operated on: in 1874 patients, 627 were indirect, 927 direct, 249 both direct and indirect, and 71 sliding (femoral hernia excluded). From the same hospital, Obney and Chan³ in 1984 reported 1057 oper-

TABLE 2. Interval from Operation to Recurrence

Interval	Number	Per Cent
Less than 1 month	13	2.2
2-23 months	142	24.3
2-5 years	169	28.9
6-10 years	113	19.3
11-15 years	51	8.7
16-20 years	38	6.5
21-25 years	18	3.1
Over 26 years	40	6.8

TABLE 3. Type of Recurrence: 584 Hernias

Type	Right	Left	Total
Indirect	184	116	300
In spermatic control	152	82	234
In cord and sliding	11	22	33
Lateral to cord	6	4	10
Medial to cord	4	1	5
Diffuse weakness	11	7	18
Direct	136	105	241
Diffuse weakness	60	37	97
Localized: lateral	11	0	11
midportion	12	9	21
medial	53	59	112
Femoral	24	7	31
Femoral only	18	6	24
With indirect	1	0	1
With direct	5	1	6
Other	9	3	12
Direct and indirect	3	2	5
Complete breakdown	6	1	7
Total	353	231	584

ations performed for recurrent hernia over a 2-year period. Indirect hernias were found in 391, direct in 476, femoral in 85, and two or more hernias in 105. Of the 476 direct hernias, 110 were diffuse, 37 lateral, and 329 medial. Halverson and McVay⁴ in 1970 reported their large experience, including 40 recurrences, of which 10 were indirect, 20 direct, eight femoral, and two combined. Thieme⁵ in 1971 recorded 226 operations for recurrence: 110 indirect and 116 direct. Of the latter, 51 were near the pubic tubercle. Cox et al.⁶ in 1981 reported 100 consecutive recurrent repairs: 30 indirect, 62 direct, seven pantaloon, and one femoral. In comparison with other reports, our series showed a slight predominance of indirect recurrences.

The following are suggestions for the primary repair, based on the findings of these recurrent hernia operations.

The obvious causes of indirect recurrence are a missed hernia, low ligation of the sac, and incomplete restoration of the internal ring. The exact frequency of a missed hernia cannot be determined. In our series, 10 patients with recurrent indirect hernia (and two femoral) had their first operations here. Since the operative notes stated that a direct hernia was found and the peritoneum not opened, these were probably missed hernias. Opening the peritoneum is advisable and best accomplished by traction on the cord and incising the indirect peritoneal prolongation near the vas. This will permit exclusion of an indirect hernia, intraperitoneal evaluation of the direct area, and palpation of the transversalis edges and of the femoral ring.

A low ligation of the sac would most probably occur because the dissection at the internal ring is incomplete, *i.e.*, not within the abdominal wall; thus, the stump of the sac does not retract. In addition, an internal purse-string or an external purse-string with large bites may leave small openings through which a wedge of omentum or bowel may lead to recurrence. This cause is suggested

when remnants of the purse-string are found on one side of the recurrent sac. Complete dissection of the sac at the ring, an external purse-string with small bites of peritoneum, and a distal transfixion suture should be satisfactory.

An adequate repair of the internal ring cannot be secured unless dissection provides a clear definition of the ring, as emphasized by several authors including Griffith⁷ and Ponka.⁸ The medial, superior, and inferior aspects of the dilated internal ring can be defined during the early part of the dissection, except with a very large indirect hernia. This will require division of the lateral aspect of the cremaster, including ligation of the external spermatic vessels, which are good markers of the transversalis fascia. Appropriate repair with a snug closure can then be obtained.

How much of the cremaster muscle and internal spermatic fascia should be excised is problematic, but certainly that portion of the cord passing through the internal ring should be narrow. A reconstruction around a cord containing thickened muscle and fascia may be adequate, but, with time, these structures return to normal or may actually atrophy. The internal ring is then relatively dilated and incompetent. Mehnert and his associates⁹ found 44 of 122 indirect recurrences adjacent to the cord and lateral to the epigastric vessels.

The cause or causes of a diffuse direct recurrent hernia are seldom apparent. The possibility of an inadequate primary repair is not a satisfactory explanation, although this could be the reason, particularly if meant to indicate fascial layers sutured under excessive tension. The remarkably low recurrence rate after the Shouldice operation may in part be due to suturing with little tension. The McVay technique should be accomplished with minimal tension, although Halvorsen and McVay⁴ report a recurrence rate of 2.5% in patients followed 11 to 22 years. Continued degeneration of the fascial layers seems the most probable cause. Peacock and Madden¹⁰ indicate on the basis of their studies that a localized mesenchymal metabolic defect is at fault.

The localized defects, most often in the medial portion of Hesselbach's triangle, can best be explained by the cutting action of a suture tied too tightly. Clinical experience suggests that the greatest tension is on the second or third suture lateral to the symphysis, which is the area of the recurrence found most frequently. The careful determinations of suture tension by Read and McLeod¹¹ appear to confirm this, as well as the advantage of a relaxing incision when excessive tension is present.

At least two femoral hernias in our series were missed during the original operation, and an unknown number of the 31 others were missed hernias. Glassow¹² noted in his series of 1500 femoral hernia operations that 359 had previously had an inguinal herniorrhaphy on the same

side. Acknowledging that some were missed hernias, for the others he postulates that the inguinal repair may have opened up the femoral ring by pulling the transversalis fascia and inguinal ligament anteriorly, thus predisposing to herniation. As indicated above, opening the peritoneum and palpation of the femoral area should avoid missed hernias. Suturing of the transversalis fascia without tension should at least decrease the possibility of the anterior pull suggested by Glassow. If a relaxing incision does not accomplish this, a Cooper's ligament (McVay) repair should be considered.

For the very large direct hernias or those classified as a complete breakdown, synthetic material has not been necessary. Note should be made, however, of utilization of the preperitoneal approach for these patients. Read¹³ has successfully used Marlex[®] mesh in this situation; Peacock¹⁴ has reported excellent results using a large sheet of fascia lata.

This discussion has centered mainly on the technical aspects of recurrence, omitting such important factors as the presence of severe emphysema and bronchitis. The original objective, however, has led to a better appreciation of the necessity of observing proper technique in the performance of a primary inguinal herniorrhaphy. These have been noted in the discussion with the exception of one factor implied by Halvorsen and McVay⁴: the appropriate primary operation repair must be selected for each patient.

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