

Pure tissue repair. What We have learned from the Guarnieri's' technique for inguinal hernia repair Francesco Guarnieri MD; Moscatelli Franco MD; Calistus Nwamba MD; Walter Smaldone MD Clinica Guarnieri – Via Tor De' Schiavi 139 – 00172 Rome Italy guarnieri@mclink.it



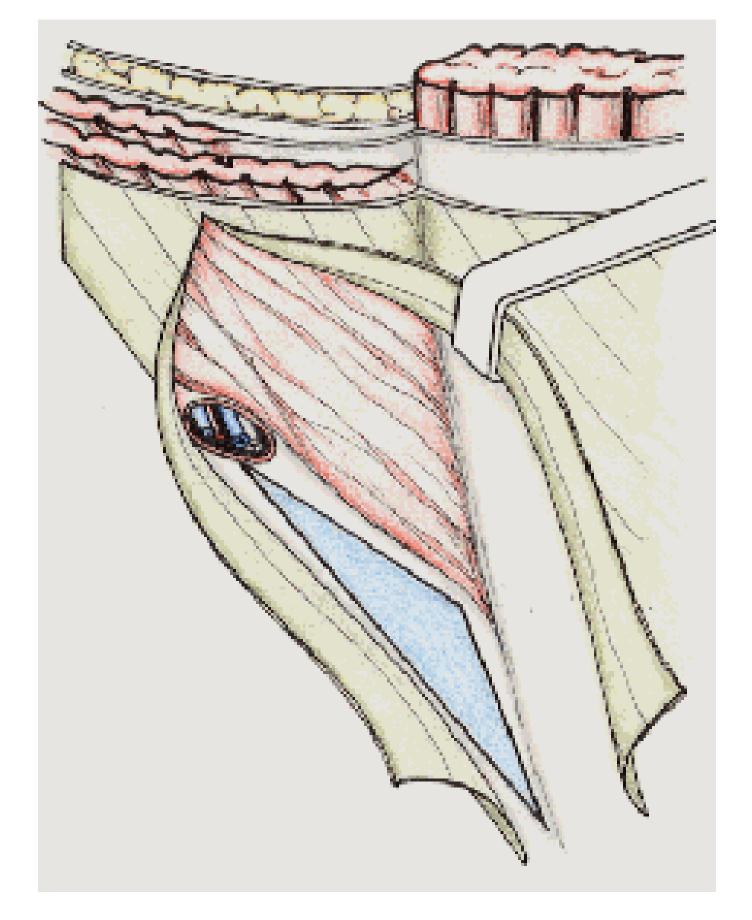
ABSTRACT: The quality of an hernia operation can be summarized with the word SETUP (Surgical Experience – Technique Used – Patient). Recurrence is no more a problem because of the mesh. Meshes can lead to more complications so the experienced surgeon avoids the mesh and likes to performed either with or without mesh. Its main characteristic is to modify the anatomy of the pathological inguinal canal (herniosis) and preserve the physiology. The mesh is now used in only 15 % of patients with primary hernia. The main characteristics of this technique are here discussed also considering indications, surgical experience and anatomical variations. We think that the inguinal triangle is a passive area that predispose to hernia formation. We believe that this area of the inguinal canal is most stressed by the abdominal pressure following the Laplace law of physics.

According to our point of view, we think that the deep inguinal orifice calibration is also an important technical aspect for hernia surgery.

From December 1988 to September 2009 we have performed 5239 inguinal hernia operation: 427 were recurrence rate of 2,3 %; 4812 were primary with a recurrence rate of 0.6 %. There were very few recurrences in patients treated for primary hernia with mesh. Recurrence rate is 0,7 % in patients treated without mesh. Postoperative complications and postoperative pain are low. We recommend this operation to the trained surgeon.

Two are the critical points that involve an hernia operation:

- The Internal Ring (involves the external oblique hernias)
- The Inguinal Triangle (involves the direct hernias)



The Internal Ring

The internal ring is the site for external oblique hernias. When it is involved, it is often constituted by weak and undefined tissue. For this reason it can be difficult to calibrate. The meshes have simplified the procedure, because the calibration is easier. Most of anatomical techniques, for example the Bassini's technique fix it, so it is dysfunctional.

The Guarnieri's technique considers:

- The transposition of the internal ring where the transversalis fascia is stronger and well defined (medially towards the internal oblique muscle)

- The calibration of the internal ring

The inguinal triangle

The Laplace law



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SETUP

Year 1988

1989

1990

1991

1992 1993

1994 1995

1996

1997

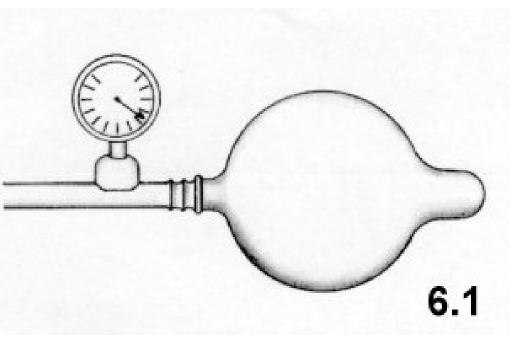
1998

1999

2000

2001

2002



The Laplace Law: $T = (P * R) / M$
Where T is the tension in the walls, P is the
pressure difference across the wall, R is the

			Primary Inguinal hernias									
•	Hernias	Recurrent	External Oblique	Direct	Mixed	Femoral	Abdomina					
ı.	13	4	6	1	0	0	2					
1	134	8	84	25	7	4	6					
1	212	21	103	46	17	4	21					
	196	18	112	30	22	2	12					
	207	14	108	43	13	7	22					
	243	30	116	45	31	4	17					
	227	24	111	38	30	3	21					
,	255	19	117	50	41	5	23					
I	347	27	166	69	54	4	27					
	271	22	110	53	56	5	25					
	302	20	151	49	48	5	29					
	323	29	152	60	51	8	23					
	0 = 4	0-	100	- 4								

- Surgical Experience

- Technique Used

- Patient

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The inguinal triangle is an area of the inguinal canal not covered by musculature (see the pictures on the left). This area is surrounded by musculature. The wider is this area the more is the risk of developing hernia. This can be proved by the Laplace Law. For this reason this area must be either reduced or reinforced.

The reinforcement can be obtained by thickening the transversalis fascia or placing a mesh.

The reduction can be obtained either reducing the concavity produced by the herniation or approaching the margins without generating tension of the sutures.

For these reasons the tension free techniques are not without tension, there is a great difference between the tension under rest (patient on the operation table) and under stress.

Transversalis Fascia Inquinal Ligament

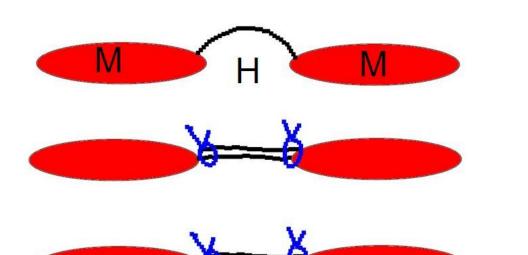
Correct

The Guarnieri's technique considers this aspects:

- Passive area reduction
- Passive area reinforcement

M

Avoid suture tension



M=Muscle H=Hernia P=Prosthesi he muscular area is here represented in red: this is an active area, able to contracts. The passive area

(black line) is that generating the hemia The double breast suture (blue stitches) reinforce the hernioplasty increasing the wall thickness. The nesh (P) can be used to further reinforce the passive area

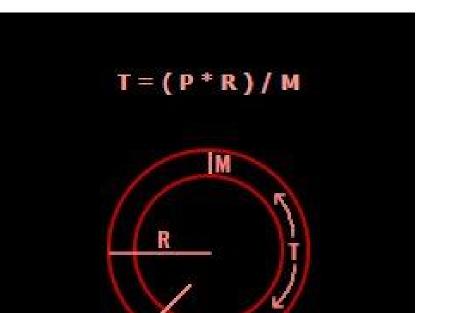


Μ Wrong Sutures must be between muscular fascia and fascia, never full-thickness or immobilizing and incapacitating muscular structures. It is suggested to make small holds to avoid suture traction and realize a tension free

The Laplace Law can be applied to the hernia sac and to the inquinal triangle hernioplasty. It is not advisable to fix muscular structures to the inguinal

Γ = (P*R)/M

radius of the cylinder, and M is the thickness of the wall



R = RADIUS

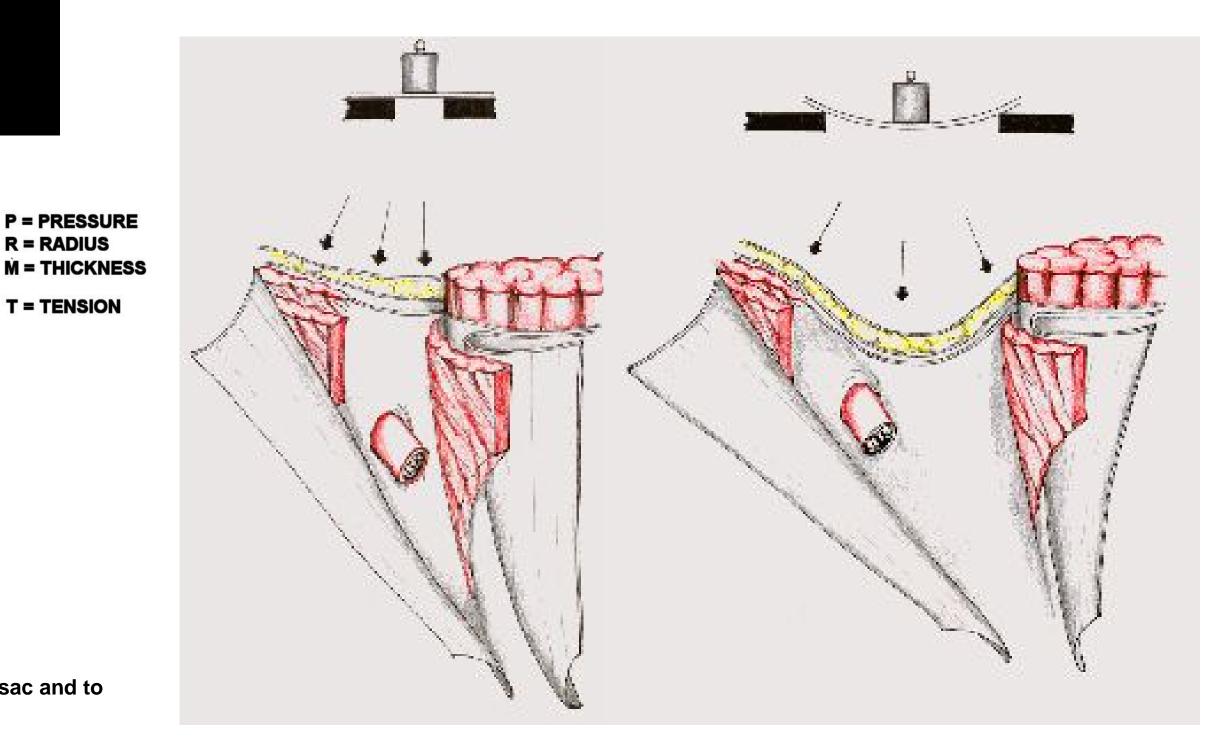
T = TENSION

2002		<u> </u>	101	10	00	0	74
2003	398	31	170	59	83	3	52
2004	349	27	133	36	112	3	38
2005	300	13	99	25	102	3	58
2006	258	12	84	24	83	3	52
2007	272	17	84	22	89	5	55
2008	233	14	90	21	64	3	41
2009	184	8	56	14	74	4	28
TOTAL	5892	427	2601	936	1185	90	653

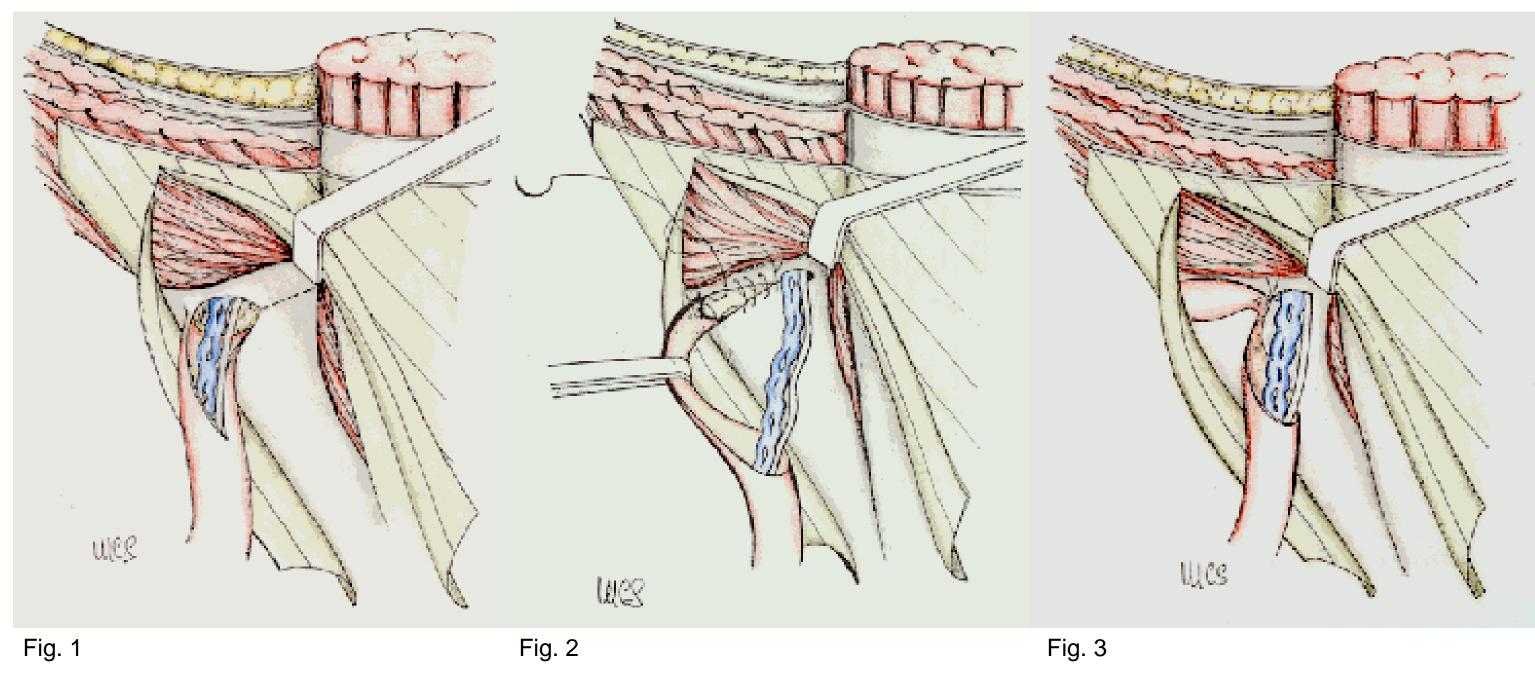
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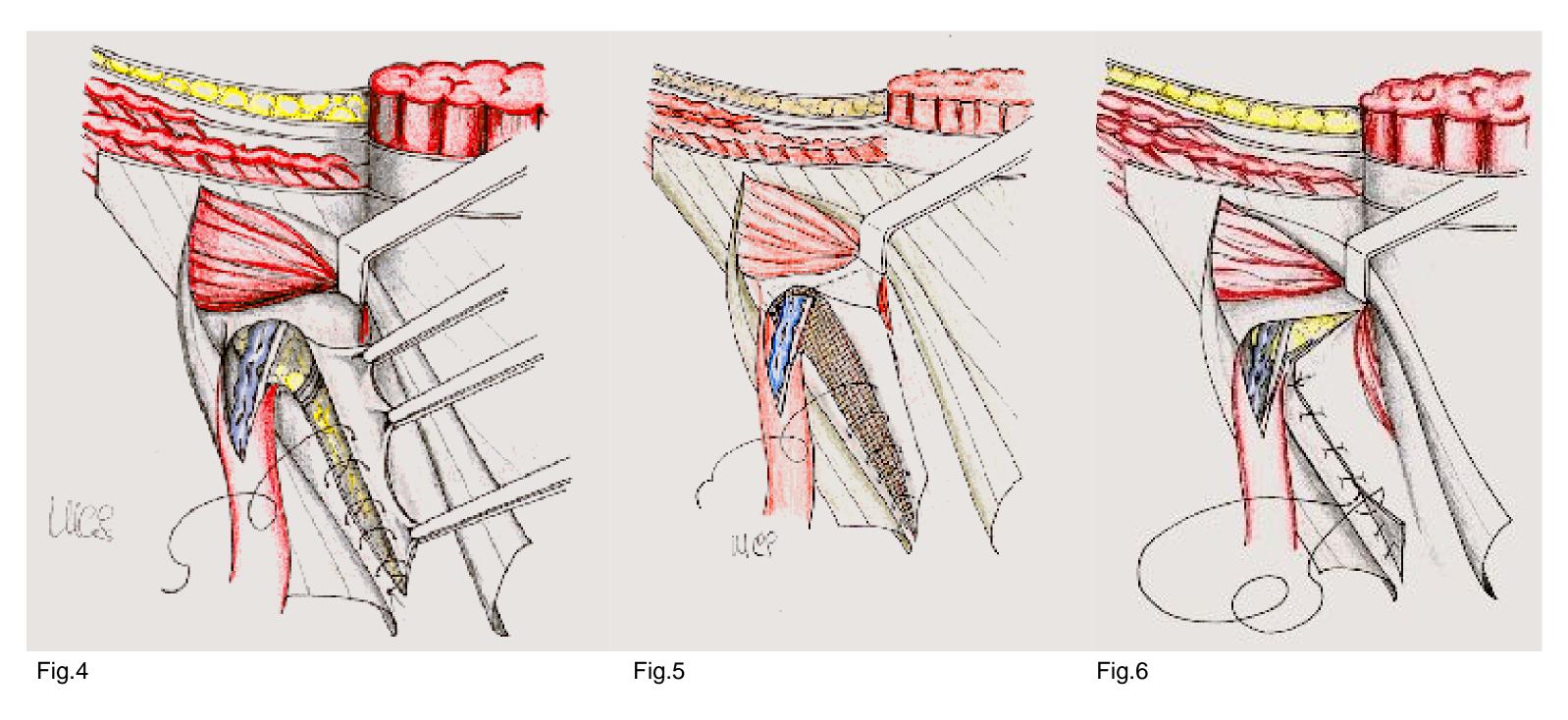
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From December 1988 to September 2009 we have performed 5239 inguinal hernia operation: 427 were recurrent hernias always treated with mesh, with a recurrence rate of 5 %; 4812 were primary with a recurrence rate of 0.6 %. There were very few recurrences in patients treated for primary hernia with mesh. Recurrence rate is 0,7 % in patients treated without mesh



The Guarnieri's technique







An incision on the funiculus involving the proximal tract of the internal spermatic fascia as far as the deep ring, is performed.

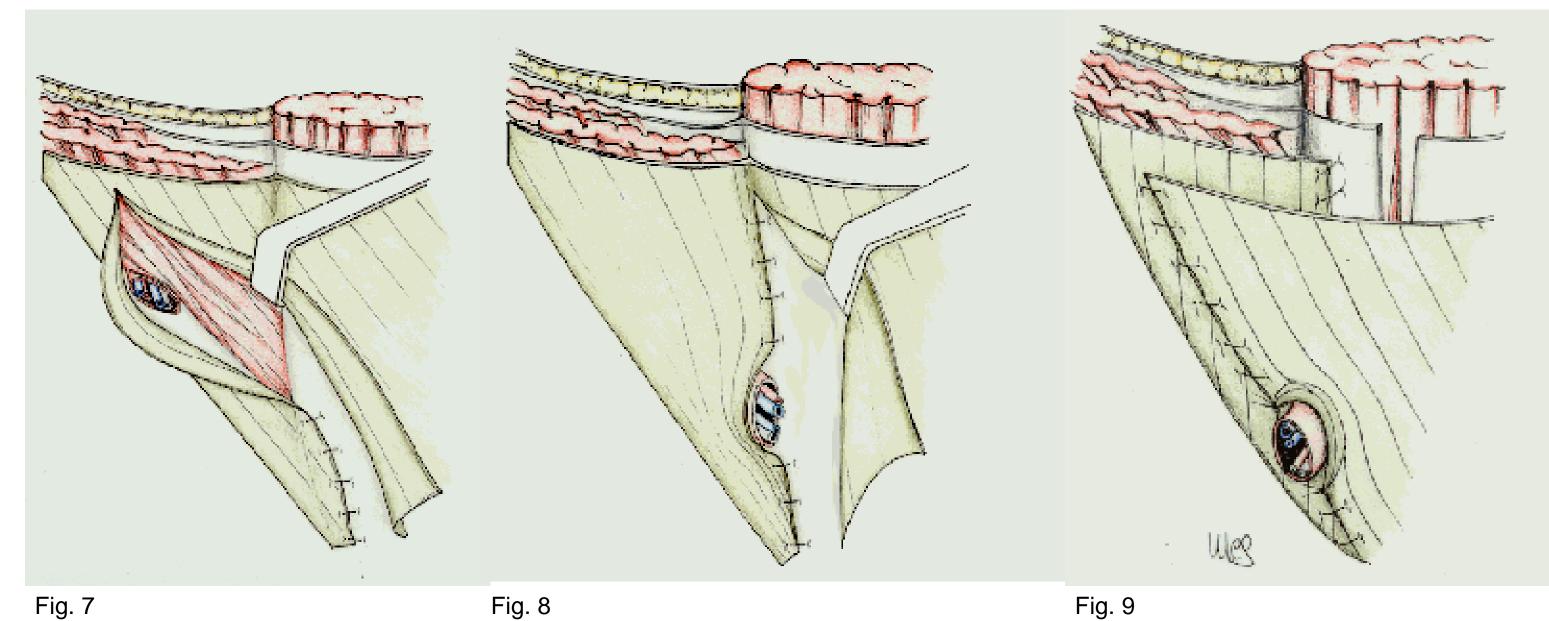
The sac, beyond the neck, is isolated. It can be either resected or simply pushed in the preperitoneum. I prefer the second choice, unless the sac is very long and adherent. In this case, I divide it leave the fundus in situ.

The elements of the funiculus (vessels and deferent) are separated from the proximal tract of the internal spermatic fascia and cremaster and then isolated. The isolation is extended to the level of the deep ring and, for a few centimeters, in the preperitoneal area.

A two-centimeter incision is performed on the transversalis fascia and aponeurosis of the transversus, starting on the deep ring, in a medial and cranial direction (Fig. 1).

The elements of the funiculus are brought to the medial angle of this incision (Fig. 2); then, the first layer of suture is started. With the first passage of the thread, a new easily calibrated deep ring is created (Fig. 1). The incision is then sutured until the original ring is completely closed (Fig. 2). Keeping the same suture, a second layer is created, but in the opposite direction, to cover the first layer with the cremaster and internal spermatic fascia. (Fig. 3).

Superficial layer reconstruction



Deep Layer: Direct hernia or indirect hernia with a large defect.

Transformation of the large defect into a small-defect indirect one. The surgery is then completed following the repair technique for a small-defect external oblique hernia.

Having isolated the funiculus and retracted the internal oblique muscle the rest of the operation will follow a precise pattern depending on the nature of the hernia.

In indirect hernia, a medial incision is performed, which involves the proximal tract of the internal spermatic fascia and the deep ring. A second incision on the transversalis fascia of the deep ring up to the pubic spine is performed. In direct hernia, the transversalis fascia above the hernial sac is resected. Then, an incision on the fascia transversalis is extended cranially, up to the deep ring.

The preperitoneum is detached from the transversalis fascia medially to the hernial defect, beyond the lateral margin of the rectus sheath.

The posterior wall of the inguinal canal is partially closed through overlapping of the flaps with a continuous suture. The suture joins the iliopubic tract to the internal surface of the transversalis fascia at the level of the lateral margin of the rectus muscle (Fig. 4). It starts at the pubic spine and stops at the level of the inferior epigastric vessels. The left-over medial flap of the transversalis fascia is joined, using the same continuous suture, to the iliopubic tract. (Fig.6). The suture does not involve the inguinal ligament and only touches lightly, the deep ring, which is left open.

Then one proceeds as if dealing with a were an indirect hernia with a medium-small defect

The repair of the superficial layer is the same as in all hernias.

The external side of the inferior-lateral border of the external oblique aponeurosis is freed completely from every adhesion. The point at which the inferior part of the internal oblique muscle reaches the rectus sheath is found. At this level a new superficial ring is created: the suture is performed between the margin of the inferior-lateral flap of the external oblique aponeurosis and the rectus sheath, along a line parallel and 1 cm medially from the lateral margin of the rectus muscle. The suture runs up to the pubis

(Fig. 7), while the funiculus is kept laterally to the operation field. Therefore, the suture is behind the funiculus. Usually, we use continuous suture in both directions, so that it is easier to tie the thread.

The funiculus is relocated in its place, leaning completely on the internal oblique muscle.

Enough space is left for the exit of the funiculus (Fig. 8), and a second suture between the rectus muscle sheath and the lateral margin of the external oblique aponeurosis, along the previous line, is performed. The third suture level is, therefore, completed. The fourth layer is characterized by the suture which involving the superior-medial flap of the external oblique aponeurosis and the external side of the inferior-lateral aponeurotic flap, so that there is wide overlapping without much tension. This suture level, as the previous one, is ante-funicular and proceeds from the neo-superficial ring to the cranial extreme of the incision and retro-funicular from the superficial neo-orifice to the pubis (Fig. 9).

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123

2008

2009

28

21

HERNIA TYPE AND MESH

% MESH 2002-2009

Femora Recurren

16%

15%

Mixe

5										USE OF THE MESH (2002-2009							
Patients a	nd results													IMARY RNIAS			
PATIENTS	HERNIA OPERATION	NS AGE MA	XAGE MIN	AGE AV	G M/F	RECURRENC	ES % REC		POSTOP	ERATIVE COM	IPLICATIONS	Ann		No		HERNIA	
PRIMARY HERNIAS	4812	99	1	54	13:1	27	0,56%	COMPLICATION	PRIMARY HERNIA	RECU	RRENT HERNIA	0	Mesh	Mesh	%	HERINA	USE
RECURRENT HERNIAS		91	34	59	22:1	10	2,34%	Subcutaneous Seroma	288	6,00%	59 14,00%						
ABDOMINAL HERNIAS			-	-	NR		NR	Temporary Testicular Edema	4	0,10%	8 2,00%	2002	126	218	37%	Indirect	Direct
		URRENCI	•					Hematomas	19	0,40%	8 2,00%	2003	109	203	35%	27%	21%
PRIMARY HERNIA	S NUMBER			RENCES	5 4	% RECURRI		Wound Infections	4	0,10%	3 0,80%	2003	109	203	5576		
WITH MESH		1123			1		0,09%	Testicular Atrophy	9	0,20%	6 1,50%	2004	121	160	43%	Femora	Recurr
WHITHOUT MESH		3599			27		0,75%	PATIENTS	4812		427					1	t
RECURRENT HER	NIAS								ANESTHESI	Α		2005	95	131	42%	100%	100%
WITH MESH		427			10		2,34%	HOSPIDALIZATION DAYS (2008 ONLY)	HERNIA TYPE LOCAL	GENERAI SPINAL							
FEMORAL HERNIA	AS							MIN MAX AVG	PRIMARY 75%	15% 10%		2006	44	147	23%	% MF	ESH 200
WITH MESH		90			0		0,00%	0 15 1,39	RECURRENT 60%	25% 15%		2007	41	154	21%		

Conclusions

The Guarnieri's technique is innovative compared to more classical anatomical techniques. Although providing for the use of prostheses as the most modern techniques, such use is reduced.