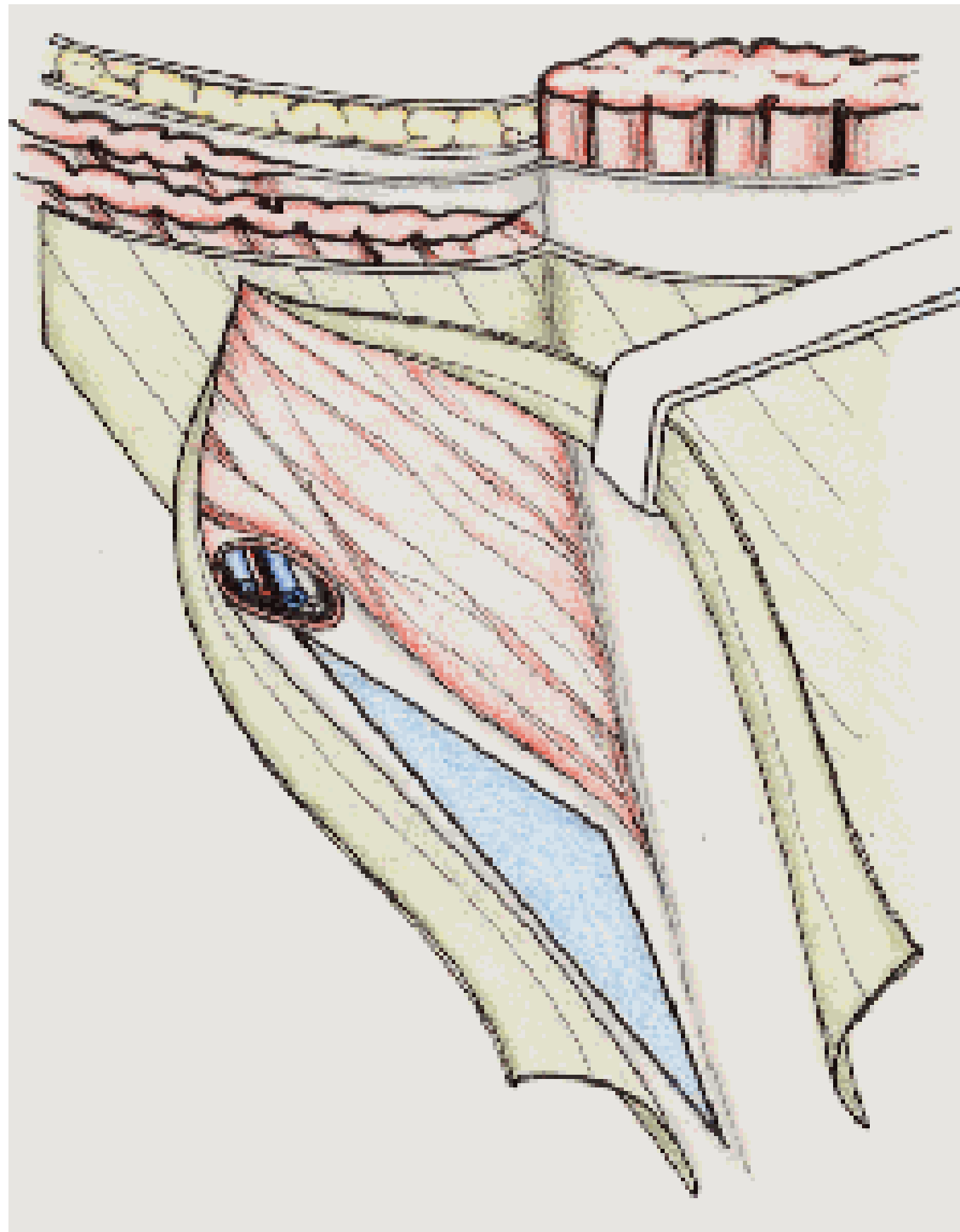


**ABSTRACT:** The quality of an hernia operation can be summarized with the word SETUP (Surgical Experience – Technique Used – Patient). Recurrence is no more a problem because of the mesh. Meshes can lead to more complications so the experienced surgeon avoids the mesh and likes to perform a pure tissue repair. The Guarnieri's technique can be 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 recurrent hernias always treated with mesh, with a 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 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.

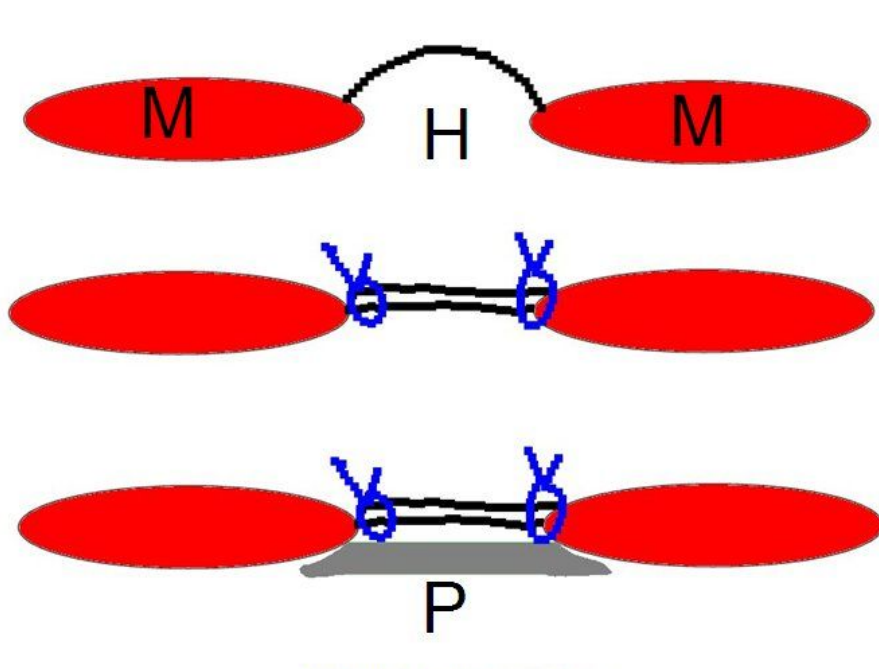
The reinforcement can be obtained by thickening the transversalis fascia or placing a mesh.

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

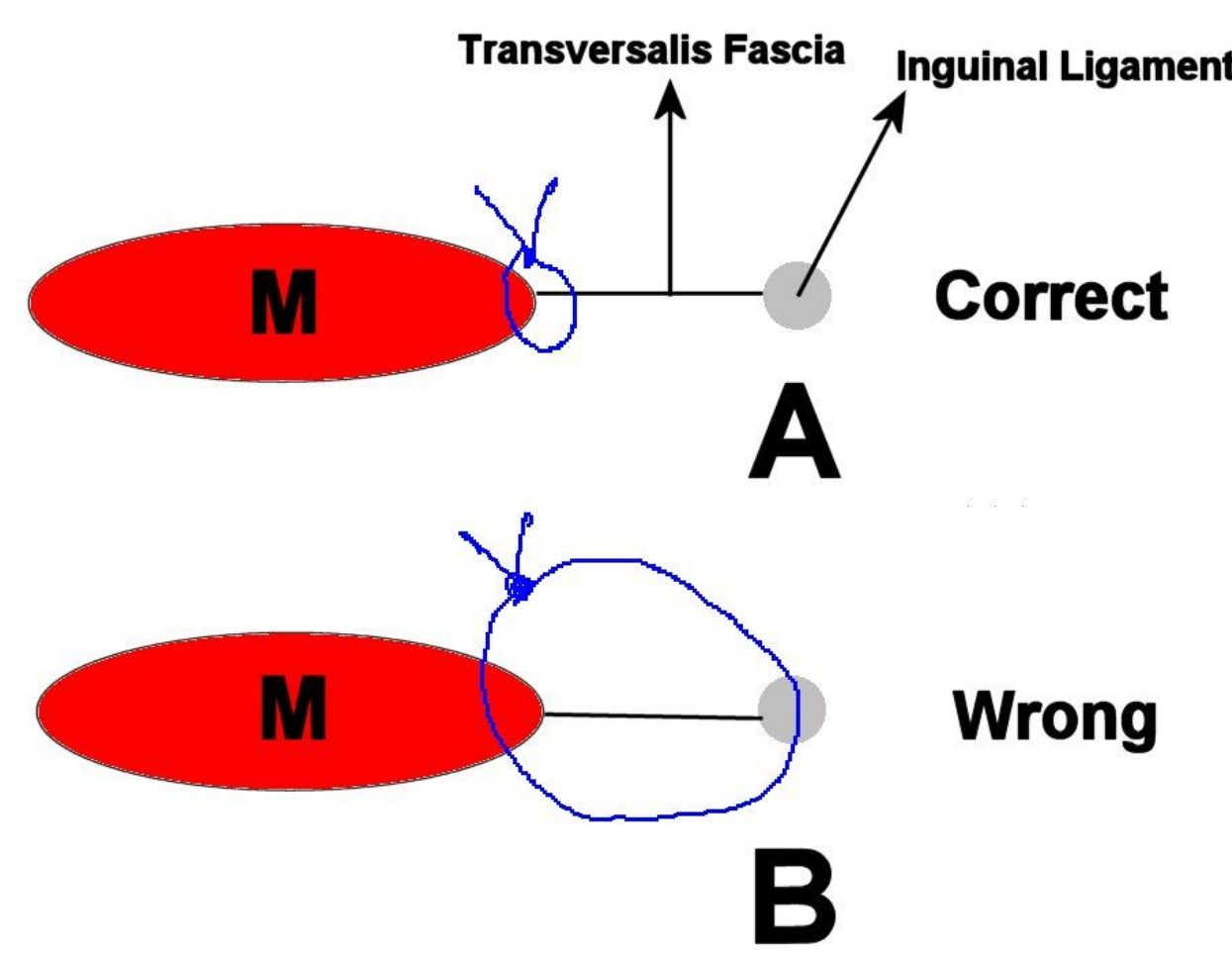
For these reasons the tension free techniques are not without tension, there is a great difference between the tension under rest (patient on the operation table) and under stress.

**The Guarnieri's technique considers this aspects:**

- Passive area reduction
- Passive area reinforcement
- Avoid suture tension



The prosthesis should be applied in few patients, in most patients it is not necessary

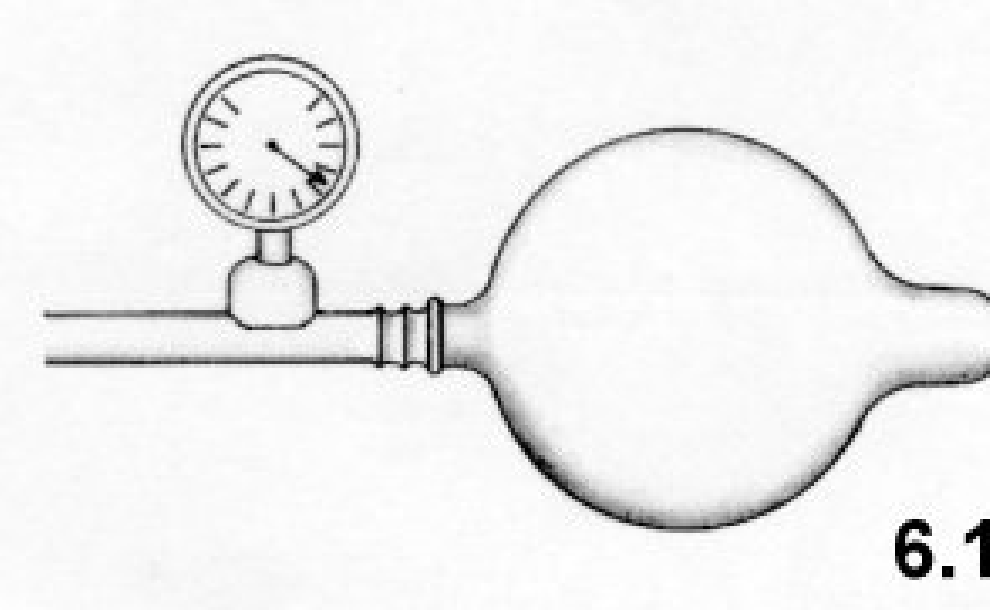


Sutures must be between muscular fascia and fascia, never full-thickness or immobilizing and incapacitating muscular structures. It is suggested to make small holds to avoid suture traction and realize a tension free hernioplasty. It is not advisable to fix muscular structures to the inguinal ligament.

**SETUP**

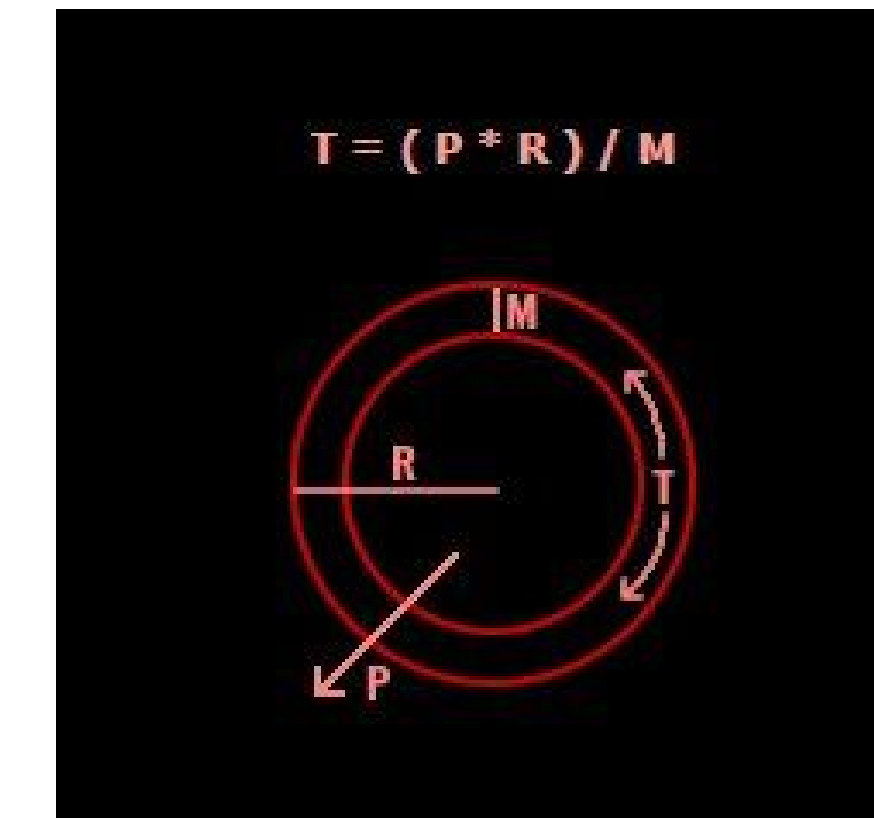
- Surgical Experience
- Technique Used
- Patient

**The Laplace law**



The Laplace Law:  $T = (P \cdot R) / M$

Where T is the tension in the walls, P is the pressure difference across the wall, R is the radius of the cylinder, and M is the thickness of the wall



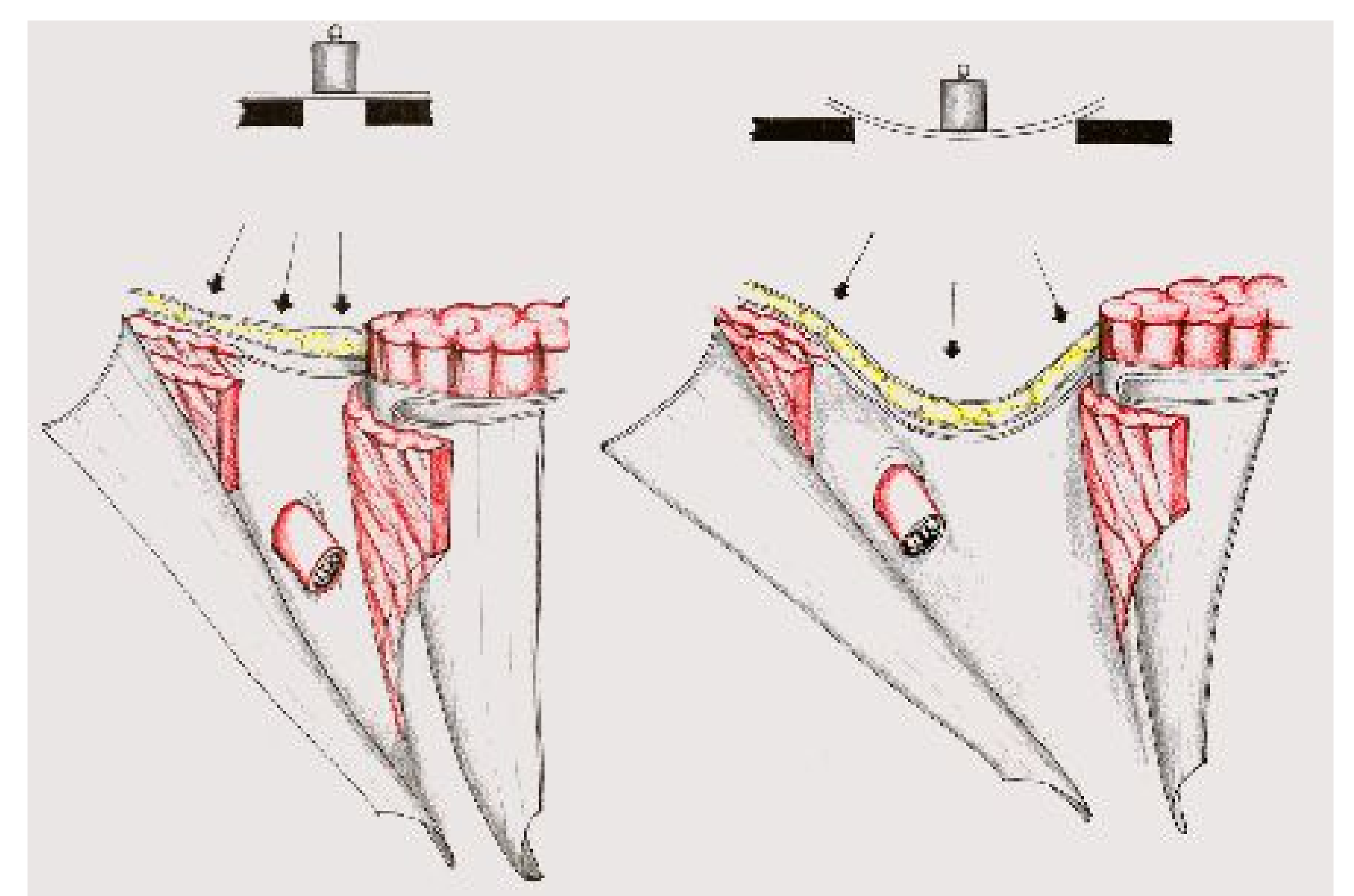
$T = (P \cdot R) / M$

The Laplace Law can be applied to the hernia sac and to the inguinal triangle

**Our surgical experience**

Year	Hernias	Recurrent	Primary Inguinal hernias				
			External Oblique	Direct	Mixed	Femoral	Abdominal
1988	13	4	6	1	0	0	2
1989	134	8	84	25	7	4	6
1990	212	21	103	46	17	4	21
1991	196	18	112	30	22	2	12
1992	207	14	108	43	13	7	22
1993	243	30	116	45	31	4	17
1994	227	24	111	38	30	3	21
1995	255	19	117	50	41	5	23
1996	347	27	166	69	54	4	27
1997	271	22	110	53	56	5	25
1998	302	20	151	49	48	5	29
1999	323	29	152	60	51	8	23
2000	354	25	166	54	79	4	26
2001	303	17	202	97	41	3	33
2002	421	27	181	75	88	8	42
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	154	8	56	14	74	4	28
<b>TOTAL</b>	<b>5892</b>	<b>427</b>	<b>2601</b>	<b>936</b>	<b>1185</b>	<b>90</b>	<b>653</b>

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**

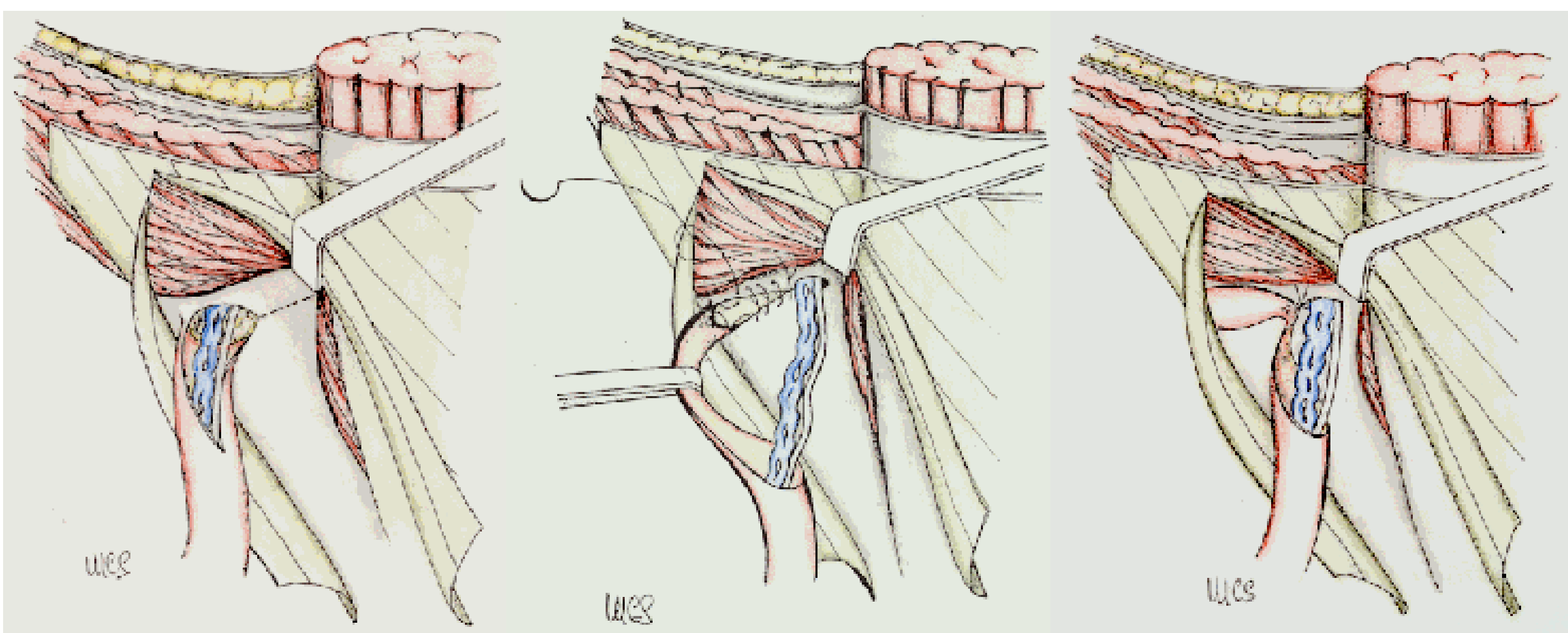


Fig. 1 Fig. 2 Fig. 3

**Deep layer: Indirect hernia with a medium-small defect.**

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**

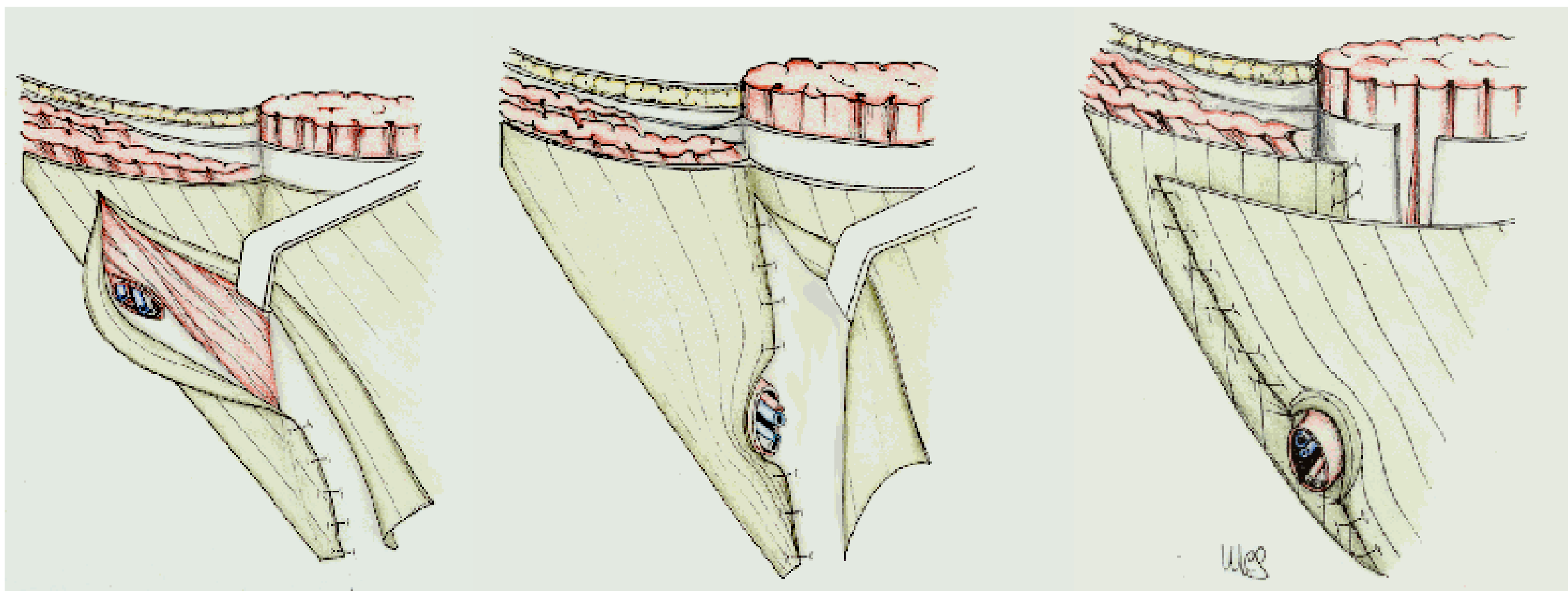


Fig. 7 Fig. 8 Fig. 9

**Patients and results**

PATIENTS	HERNIA OPERATIONS	AGE	MAX AGE	MIN AGE	AVG	M/F	RECURRENTS	% REC
PRIMARY HERNIAS	4812	99	1	54	13.1	27	0,56%	
RECURRENT HERNIAS	427	91	34	59	22.1	10	2,34%	
ABDOMINAL HERNIAS	653	-	-	-	-	-	NR	

RECURRENTS (1988-2009)			
PRIMARY HERNIAS	NUMBER	RECURRENTS	% RECURRENCE
WITH MESH	1123	1	0,09%
WHITHOUT MESH	3599	27	0,75%

RECURRENT HERNIAS			
WITH MESH	NUMBER	RECURRENTS	% RECURRENCE
WITH MESH	427	10	2,34%

FEMORAL HERNIAS			
WITH MESH	NUMBER	RECURRENTS	% RECURRENCE
WITH MESH	90	0	0,00%

COMPLICATION	PRIMARY HERNIA		RECURRENT HERNIA	
	Number	%	Number	%
Subcutaneous Seroma	288	6,00%	59	14,00%
Temporary Testicular Edema	4	0,10%	8	2,00%
Hematomas	19	0,40%	8	2,00%
Wound Infections	4	0,10%	3	0,80%
Testicular Atrophy	9	0,20%	6	1,50%
<b>PATIENTS</b>	<b>4812</b>		<b>427</b>	

HOSPITALIZATION DAYS (2008 ONLY)	ANESTHESIA		
	HERNIA TYPE	LOCAL	GENERAL/SPINAL
MIN	75%	15%	10%
MAX	60%	25%	15%
AVG	0	15	1,39

Ann o	PRIMARY HERNIAS		%	HERNIA TYPE AND MESH USE		
	Mesh	No Mesh		Indirect	Direct	Mixed
2002	126	218	37%			
2003	109	203	35%	27%	21%	49%
2004	121	160	43%	Femora l	Recurren t	
2005	95	131	42%	100%	100%	
2006	44	147	23%	% MESH 2002-2009		
2007	41	154	21%			
2008	28	147	16%			
2009	21	123	15%			

**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.