

The European hernia society groin hernia classification: simple and easy to remember

M. Miserez · J. H. Alexandre · G. Campanelli · F. Corcione · D. Cuccurullo ·
M. Hidalgo Pascual · A. Hoferlin · A. N. Kingsnorth · V. Mandala · J. P. Palot ·
V. Schumpelick · R. K. J. Simmermacher · R. Stoppa · J. B. Flament

Received: 30 December 2006 / Accepted: 11 January 2007
© Springer-Verlag 2007

Abstract After reviewing the available classifications for groin hernias, the European Hernia Society (EHS) proposes an easy and simple classification based on the Aachen classification. The EHS will promote the general and systematic use of this classification for intra-operative description of the type of hernia and to increase the comparison of results in the literature.

Keywords Hernia · Inguinal · Femoral · Groin · Classification

Introduction

Many different groin hernia classifications are available. Most of them are complex and therefore difficult to remember. The result is infrequent systematic use in

R. Stoppa died a few months ago.

M. Miserez (✉)
Department of Abdominal Surgery,
University Hospital Gasthuisberg,
Herestraat 49, 3000 Leuven, Belgium
e-mail: Marc.miserez@uz.kuleuven.ac.be

J. H. Alexandre
Paris, France

G. Campanelli
Department of Surgical Sciences,
Policlinico Hospital IRCCS,
University of Milano,
Pad. Beretta Est Via Francesco Sforza,
35, 20122 Milano, Italy

F. Corcione · D. Cuccurullo
Department of General and Laparoscopic Surgery,
Monaldi Hospital, Via Leonardo Bianchi,
80131 Naples, Italy

M. H. Pascual
Department of Surgery, 12 de Octubre
University Hospital, Madrid, Spain

A. Hoferlin
Katholisches Klinikum Mainz SHK,
Chirurgische Abteilung, Hildegardstr. 2,
55131 Mainz, Germany

A. N. Kingsnorth
Peninsula Medical School, Level 7,
Derriford Hospital, Plymouth, PL6 8DH, UK

V. Mandala
Department of General and Emergency Surgery,
Villa Sofia, CTO Hospital, Palermo 90015, Italy

J. P. Palot
Service de Chirurgie Generale et Digestive,
Hopital Robert-Debre-CHU, 51092 Reims, France

V. Schumpelick
Department of Surgery, Medical Faculty,
University Hospital, Rheinisch-Westphalian
Technical University (RWTH), Pauwelsstrasse 30,
52074 Aachen, Germany

R. K. J. Simmermacher
Department of Surgery, University Hospital,
3584X Utrecht, The Netherlands

R. Stoppa
Amiens, France

J. B. Flament
Department of Surgery and Anatomy,
Reims University, Service de Chirurgie Generale,
Hopital Robert-Debre-CHU, 51092 Reims, France

daily surgical practice. During a meeting of the Board of the European Hernia Society in Capri (2004), organised by one of the authors (FC), different currently available classifications were critically reviewed. Based on the fact that a classification should be simple and educative in order to be adopted by the general surgical community, this group proposes a simplified synthesis of the currently available classifications for (intraoperative) classification of primary and recurrent inguinal or femoral hernias.

Materials and methods

Most currently available hernia classifications were reviewed one by one with respect to the number of different subgroups, relevance of the subgroups, subgroups missing and simplicity. This review was used to propose a simple classification which is easy to remember.

Results

All the different classifications have some drawbacks. Table 1 illustrates most of the currently available hernia classifications. The Nyhus classification is one of the most frequently used classifications, but is not so easy to remember [1], like the Stoppa classification, which is derived from the Nyhus classification, with special attention to the aggravating factors [2]. The Bendavid type, staging, dimension (TSD) classification is very complex, with 20 different subtypes [3]. Moreover, some of the available classifications, such as the Gilbert classification [4] lack the description of femoral hernias or combined hernias (e.g. pantaloon hernia). A simple and easy-to-remember classification is the Aachen classification [5], making a distinction between

the anatomic localisation (indirect or lateral vs. direct or medial) and the size of the hernia orifice defect in cm (<1.5, 1.5–3, >3 cm).

Our proposed classification resembles largely the Aachen classification. In order to further increase simplicity and accuracy, we decided to modify the latter classification only with respect to some minor points, thereby adhering to the major criteria of the Aachen classification. In the Aachen classification, 1.5 cm is used as reference for the size of the hernia orifice. We propose the index finger as the reference in open surgery, since the usual size of the tip of the index finger is mostly around 1.5–2 cm. This dimension is also reported to be identical to the length of the branches of a pair of most laparoscopic graspers, dissectors or scissors, enabling the surgeon to use the same classification during laparoscopic surgery.

As can be seen in Table 2, the size of the hernia orifice is registered as 1 (≤ 1 finger), 2 (1–2 fingers) and 3 (≥ 3 fingers). Thus a hernia orifice of 2.5 cm is depicted as a size 2 hernia. For the anatomic localisation, the same criteria are used as in the Aachen classification (L = lateral, M = medial, F = femoral). For a combined hernia we propose to mention the different hernias in the table by ticking the appropriate box instead of using the term Mc as in the Aachen classification.

In addition, the letter P or R can be encircled to depict, respectively, a primary or recurrent hernia.

Discussion

Hernia classifications are useful for pre- or intra-operative description of the anatomy and size of a groin hernia. This objective description is a prerequisite in the case of tailored surgery, e.g. suture repair versus mesh repair in small indirect inguinal hernias without attenu-

Table 1 Overview of the heterogeneity of different inguinal hernia classifications

	Indirect			Direct		Fem	
					Rec		
Gilbert	1	2	3	4	5		
Stoppa	1		2	3	4		
Nyhus	I	II	IIIb	IIIa	IV	IIIc	
Bendavid TDS	I	1	2	3	II	V	III IV
Alexandre	1	9	L	cm	2	R	3 4
TOS		0	∅	cm			
Schumpelick	L I	L II	L III	M I	II	III R	F
Corcione	1			2			3
Cost	1	2	3	1	2	3	
Porrero	1	2	3	5	4		

Table 2 The EHS groin hernia classification

EHS Groin Hernia Classification	Primary		Recurrent		x
	0	1	2	3	
L					
M					
F					

ation of the posterior wall of the inguinal canal (type L1). Objective hernia classification is also necessary in order to compare outcome after surgery in specific subgroups.

Many different classifications, all based on the presence of a direct, indirect or femoral hernia, have been described, from as early as 1967–1970 [6, 7] and later by Gilbert [4] (modified by Rutkow and Robbins [8]) and Nyhus [1] (modified by Stoppa [2]). The problem with these classifications is that they are based on the findings during open (anterior) approach [9, 10], they are not so easy to remember, lack an objective determination of the hernia orifice (e.g. clear differentiation between a small and medium-sized direct hernia) or lack a clear description of a combined or femoral hernia. This has limited their widespread use both in everyday practice (clear description in operation reports) and even in the literature, with the Nyhus classification being the most widely used, especially in the USA.

We agree with Zollinger [11] that the ideal classification system should be based on anatomic location, be applicable to anterior and posterior approaches and easy to remember. Zollinger also mentioned the description of anatomic function (competency of internal ring, integrity of the floor, defect size and descent of the sac). Zollinger has made an attempt to overcome the aforementioned shortcomings, though we believe that this so-called updated traditional classification [12] is difficult to remember for general surgeons without graphic representation of the different types.

Schumpelick et al. [5] described in 1994 the most simple Aachen classification, based on type and size of the hernia defect, currently available for widespread use. In order to further increase simplicity and accuracy, we propose some minor alterations: clear description of combined or femoral hernias, primary or recurrent hernia, the largest diameter to be used for quantification of hernia orifice size and clear definition of the 1.5 cm reference, both in open and laparoscopic surgery.

Of course a simple classification with only these two variables is a compromise and lacks a very detailed description of the hernia. We did not include the factor of anatomic function as proposed by Zollinger [11], since it would increase the complexity of the classification.

Scrotal extension of the hernia sac (especially if irreducible) represents a major challenge for the surgeon [13] and might influence the early outcome after surgery, e.g. the incidence of postoperative seroma formation. Although our proposal does not include size or descent of the hernia sac, most irreducible scrotal hernias are large indirect hernias (L3). Thus, this subgroup is clearly identified in the proposed classification.

This classification does not allow evaluation of the function of the internal ring or posterior wall of the inguinal canal. This is difficult to assess in any intervention under general anesthesia. Moreover it is not clear if this information adds substantially to the outcome in comparison with a pure anatomical description of the hernia orifice type and size.

At first sight, the classification also does not take into account the presence of bulging or weakness of the posterior wall of the inguinal canal [14] or the presence of a cord lipoma [15]. These two aspects may nonetheless be important in the repair of an inguinal hernia, especially if they were not recognised and as a consequence not treated, leading to an early (pseudo) recurrence. We suggest a herniating preperitoneal lipoma or cord lipoma should be described as a lateral hernia L1 (which it is).

With respect to weakness of the posterior wall, we suggest this should qualify as a medial hernia, if it could be imbricated by plication of the transversalis fascia, whether this is done or not. In our opinion, this reflects the fact that a true defect is present. In cases of some diffuse bulging of the posterior wall (without an obvious well-circumscribed defect) where imbrication of the transversalis fascia is not possible, we suggest the use of the terminology of a direct hernia adding the letter x (=Mx). Since alterations in the transversalis fascia might be linked to a possible biological factor in the development of a hernia [16, 17], a systematic description of the posterior wall on a uniform basis must be promoted. In our opinion, this definition can be used both in open and laparoscopic surgery. Most importantly, the fact that a surgeon may be in doubt whether or not (and how) to describe the defect already indicates that a defect is present, which should be reported.

This also opens the problem of how to reconstruct from the depicted class the fact that the femoral canal was not examined intraoperatively, e.g. during a Lichtenstein repair, versus the absence of a hernia. We propose to use the appendix x if unclear [e.g. no examination of the femoral canal during a Lichtenstein repair for a large indirect scrotal hernia = L3Fx vs. L3F0 if no femoral hernia is present]. This again allows the classification to be used both in open and laparoscopic surgery.

Other characteristics such as the type of anesthesia or whether a hernia is incarcerated or irreducible, or has a sliding component can easily be added. However, the large majority of hernias seen in the real world will be easily, clearly and objectively described with the current classification. For recurrent hernias, a further detailed description could be done using a specific subclassification, as proposed by Campanelli [18].

Ideally, journals should stimulate authors reporting on (groin) hernias to use a classification systematically, especially if the endpoints (mainly recurrence rate) are or might be related to the type and/or size of hernia. This should increase the comparability of different papers (e.g. meta-analysis) on the same subjects and allow further studies in specific clearly defined subgroups.

However, the major task to accomplish will be to convince all surgeons practicing hernia surgery to report the class of the groin hernia systematically in the operative report for later analysis. To support this, the EHS will provide classification forms to be downloaded on its website (<http://www.herniaweb.org/>) soon. Ideally, these data, together with patient-related data and the type of repair should be collected in a prospective nationwide registry securing patient and surgeon anonymity.

References

- Nyhus LM, Klein MS, Rogers FB (1991) Inguinal hernia. *Curr Probl Surg* 28:403–450
- Stoppa R (1998) Groin hernias in the adult. In: Chevrel J-P (eds) *Hernias and surgery of the abdominal wall*. 2nd edn. Springer, Berlin, pp 175–178
- Bendavid R (1995) The TSD classification: a nomenclature for groin hernias. In: Schumpelick V, Wantz GE (eds) *Inguinal hernia repair*. Karger, Basel, pp 48–55
- Gilbert AI (1989) An anatomical and functional classification for the diagnosis and treatment of inguinal hernia. *Am J Surg* 157:331–333
- Schumpelick V, Treutner KH, Arlt G (1994) Classification of inguinal hernias. *Chirurg* 65:877–879
- Casten DF (1967) Functional anatomy of the groin area as related to the classification and treatment of groin hernias. *Am J Surg* 114:894–899
- Halverson K, McVay CB (1970) Inguinal and femoral hernioplasty: a 22 year study of the author's methods. *Arch Surg* 101:127–135
- Rutkow IM, Robbins AW (1993) Demographic, classification, and socioeconomic aspects of hernia repair in the United States. *Surg Clin North Am* 73:413–426
- Schumpelick V, Treutner KH, Arlt G (1994) Inguinal hernia repair in adults. *Lancet* 344:375–379
- Nyhus LM (2004) Classification of groin hernia: Milestones. *Hernia* 8:87–88
- Zollinger RM (2003) Classification systems for groin hernias. *Surg Clin North Am* 83:1053–1063
- Zollinger RM Jr (2004) An updated traditional classification of inguinal hernias. *Hernia* 8:318–322
- Kingsnorth AN (2004) A clinical classification for patients with inguinal hernia. *Hernia* 8:283–284
- Orchard JW, Read JW, Neophyton J, Garlick D (1998) Groin pain associated with ultrasound finding of inguinal canal posterior wall deficiency in Australian rules footballers. *Br J Sports Med* 32:134–139
- Lilly MC, Arregui ME (2002) Lipomas of the cord and round ligament. *Ann Surg* 235:586–590
- Klinge U, Binnebosel M, Mertens PR (2006) Are collagens the culprits in the development of incisional and inguinal hernia disease? *Hernia* 10:472–477
- Höferlin A, Isbert C, Klinge B (2003) CAMIC-Konsensuskonferenz “Leistenhernie”-Niederschrift der Ergebnisse der Arbeitsgruppe 9—Thema: Klassifikation der Leistenhernien. *Zentralbl Chir* 128:611
- Campanelli G, Pettinari D, Nicolosi FM, Cavalli M, Avesani EC (2006) Inguinal hernia recurrence: classification and approach. *Hernia* 10:159–161