The Recurrence Factors of Groin Hernia: A systematic Review

Les facteurs de récidive des hernies de l'aine et leur traitement: Une revue systématique

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RÉSUMÉ

Pré-requis : Le taux de réintervention pour récidive herniaire atteint 15%. La récidive herniaire peut être due à des facteurs locaux et/ou généraux. Le traitement d'une récidive herniaire peut s'avérer difficile et expose à une 2ème récidive avec un Risk Ratio de 2,7. L'identification des facteurs favorisant la récidive herniaire est donc indispensable en vue d'une prévention.

But : Le but de cette revue systématique de la littérature est de répondre avec niveaux de preuve aux questions suivantes : Quels sont les facteurs de risque de récidive herniaire ? et comment traiter la récidive ?

Méthodes : Nous avons effectué une recherche bibliographique sur les bases de données Pubmed et Cochrane. Les mots-clés utilisés étaient : « inguinal hernia », « groin hernia », « recurrence », « surgical repair». Ont été inclus les méta-analyses, les revues systématiques, les essais cliniques randomisés et non randomisés, datant de 2008 à 2017, dont le texte intégral était disponible en anglais, traitant des facteurs de récidive des hernies de l'aine et /ou de leur traitement.

Résultats : La recherche bibliographique nous a permis d'identifier 67 articles. Vingt-quatre articles ont été exclus pour non-conformité. Trois articles n'étaient pas disponibles en full-text. Nous avons analysé 40 articles. Après évaluation de la méthodologie, 6 articles ont été exclus : il s'agissait d'essais randomisés dont le score Jadad était inférieur à 3. Nous avons retenu au final 34 articles. L'analyse qualitative de la littérature nous a permis de conclure que Page 4/16 Tunisie Medicale l'hérédité, le sexe féminin, l'obésité et le tabagisme sont des facteurs généraux qui favorisent la récidive herniaire avec un niveau 2 de preuve. La raphie et la « TEP » pour hernie inguinale unilatérale sont des facteurs de récidive herniaire avec un niveau 1 de preuve. Ni la voie d'abord, ni le type de prothèse ou la nature de sa fixation n'influaient la survenue de récidive avec un niveau 1 de preuve. Pour le traitement des récidives, l'approche inversée (antérieure-postérieure et postérieure-antérieure) recommandée par les guidelines est discutable.

Conclusions : Au vue des résultats de l'analyse qualitative de la littérature, on est en mesure de recommander des mesures hygiéno-diététiques pour perte pondérale en cas d'obésité et le sevrage tabagique chez les patients candidats à une chirurgie pour hernie de l'aine. Concernant le traitement de la récidive herniaire, l'approche inversée recommandée dans les guidelines étant discutable, le choix de la technique adéquate dépend d'une part, de la technique chirurgicale lors de la cure initiale et d'autre part, de la préférence et de l'expertise du chirurgien.

Mots-clés

Hernie de l'aine, hernie inguinale, récidive, facteurs de risque, traitement

SUMMARY

Background : Groin hernia repair is a common intervention and reoperation rate for recurrence reachs 15%. Recurrence can be attributed to patients related factors or influenced by the surgical technique. Furthermore, treating recurrence can be challenging with the risk ratio of developing a second recurrence equal to 2,7. Identifying those factors is the first step to improve hernia repair results.

Aim : This systematic review aimed to identify recurrence risk factors of groin hernia and to determine adequate treatment for recurrence.

Methods : We conducted a literature search on the Pubmed and Cochrane databases. Keywords used were: «inguinal hernia», «groin hernia», «recurrence» and «surgical repair». Were included meta-analyses, systematic reviews, randomized and non-randomized clinical trials, from 2008 to 2017, with their available english full text which methodoly was evaluated.

Results : We identified 67 articles. Twenty-four articles were not eligible. Three articles were not available in full-text. We analyzed 40 articles. After evaluation of the methodology, six articles were excluded: these were randomized trials with a Jadad score inferior to 3. We finally selected 34 articles. The qualitative analysis of the literature revealed that heredity, female gender, obesity and smoking were general recurrence factors of groin hernia with a level 2 of evidence. Non mesh-repair and « TEP » approach for unilateral inguinal hernia favor groin hernia recurrence with a level 1 of evidence. Nor the surgical approach (laparoscopic, open), nor the mesh type, nor its fixation does affect recurrence with a level 1 of evidence. In treating groin hernia recurrence, the inverted approach (anterior-posterior and posterior-anterior) recommended in the guidelines is questionable.

Conclusions : This systematic review allowed us to recommand weigh loss and smoking cessation for patients undergoing groin hernia surgery. As concerns groin hernia recurrence treatment, the inverted approach (anterior-posterior and posterior-anterior) recommended in the guidelines is questionable. The choice of the adequate technique depends on the primary repair and also includes the surgeon preferences.

Key-words

Groun hernia, inguinal hernia, reccurente, risk factor, treatement

BACKGROUND

Groin hernia repair is a common intervention and recurrence is the main outcome measure. Reoperation rate for recurrence reachs 15% [1].

Recurrence can be attributed to patients related factors or influenced by the surgical technique. Identifying those factors is the first step to improve hernia repair results. Furthermore, treating recurrence can be challenging with the risk ratio of developing a second recurrence equal to 2,7 [2].

This systematic review aimed to identify recurrence risk factors of groin hernia and to determine the adequate treatment for recurrence.

METHODS

We conducted a literature search on the Pubmed and Cochrane databases. Keywords used were: “inguinal hernia”, “groin hernia”, “recurrence” and “surgical repair”.

Were included meta-analyses, systematic reviews, randomized and non-randomized clinical trials, from 2008 to 2017, with their available full text.

The quality of the meta-analyses and the systematic reviews was evaluated according to five criteria extracted from the QUOROM Statement (Quality of reporting of meta-analyses) [3]. The quality of randomized trials was evaluated with the Jadad score [4] and non-randomized trials with the MINORS score (Methodological Index for Non-Randomized Studies) [5].

Only meta-analyses and systematic reviews with a QUOROM score ≥3, randomized trials with a Jadad score ≥3 and non-randomized trials with a MINORS score ≥12 were considered.

We performed a qualitative analysis and conclusions were reported according to the classification of Oxford for evidence based medecine [6].

RESULTS

We identified 67 articles. Twenty-four articles were not eligible. Three articles were not available in full-text. We analyzed 40 articles. After evaluation of the methodology, six articles were excluded: these were randomized trials with a Jadad score inferior to 3. We finally selected 34 articles (Figure 1). The characteristics of included studies are summarized in Table 1.

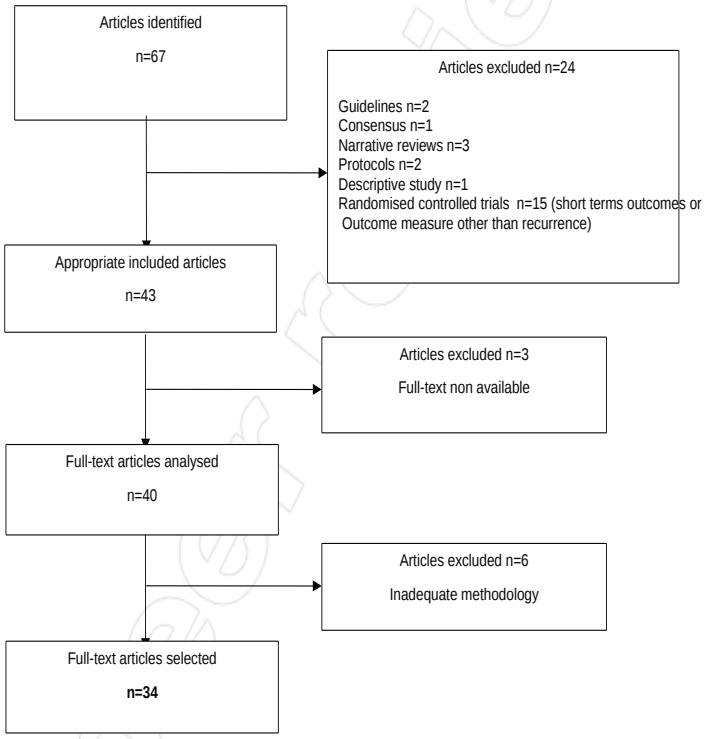

Figure 1 : Flow chart of the litterature research

Recurrence factors :
General factors

Heredity

A systematic review published in 2013 [7] including 11 retrospective studies with 37 166 patients aimed to investigate the possible heredity of groin hernias. Four studies evaluated both primary and recurrent hernias. A positive family history showed a tendency toward a higher recurrence rate with an OR= 8.43 (CI $^{95\ \%}$ 0.91-78.40, p = 0.06) and significantly earlier recurrence after the primary procedure.

This review suggests that positive family history is a recurrence factor. (Level 2 of evidence)

Sex

A systematic review with meta-analysis published in 2014 [8] included 14 retrospective studies with a total of 375 620 patients. A total of 12 studies covered 448 065 procedures in 447 968 patients and evaluated sex as a risk factor for recurrence after inguinal hernia surgery. Of those, five

Table 1 : Characteristics and methodology of the included studies

Authors	Study type	QUOROM*	Jadad**	MINORS***
Burchart et al. 2013 [7]	Systematic review	5		
Burchart et al. 2014[8]	Meta-analysis	4		
Murphy et al. 2017[9]	NRCT#			12
Iversen et al. 2017[10]	NRCT			12
Amato et al. 2009[11]	Meta-analysis	4		
O'Rreilly et al. 2012[12]	Meta-analysis	4		
Kenary et al. 2013[13]	RCT##		4	
Nikkolo at al. 2012[14]	RCT		3	
Chowbey et al. 2010[15]	RCT		3	
Sajid et al. 2013[16] (Am J Surg,Jul ;206)	Meta-analysis	4		
Currie et al. 2012[17]	Meta-analysis	3		
Fang et al. 2014[18]	Meta-analysis	5		
Hoyuela et al. 2017[19]	RCT		5	
Fan et al. 2017[20]	RCT		4	
Verhagen et al. 2016[21]	RCT		5	
Pierides et al. 2011[22]	RCT		4	
Kim-Fuchs et al. 2012[23]	RCT		3	
Jörgensen et al. 2012[24]	RCT		5	
Taylor et al. 2008[25]	RCT		4	
Ismail et al. 2017[26]	Meta-analysis	5		
Antoniu et al. 2016[27]	Meta-analysis	4		
Shah et al. 2014[28]	Meta-analysis	5		
Fang et al. 2015[29]	Meta-analysis	5		
Pandanaboyana et al. 2014[30]	Meta-analysis	3		
Sajid et al. 2014[31]	Meta-analysis	3		
Colvin et al. 2013[32]	Meta-analysis	3		
Sajid et al. 2013[33] (Am J Surg,Jun;205)	Meta-analysis	4		
Sajid et al. 2012[34]	Meta-analysis	4		
Kaul et al. 2012[35]	Meta-analysis	4		
Li et al. 2014[36]	Meta-analysis	5		
Stylianidis et al. 2009[37]	NRCT			18
Bisgaard et al. 2008[38]	NRCT			22
Sevonius et al. 2011[39]	NRCT			18
Öberg et al. 2016[40]	NRCT			18

***QUOROM :** Quality of reporting of meta-analyses [3]
****Jadad :** Jadad score [4]
***** MINORS :** Methodological Index for Non-Randomized Studies[5]
#NRCT: Non Randomized Controlled Trials
##RCT: Randomized Controlled Trials

studies were eligible for meta-analysis covering 284 898 procedures in 284 898 patients, it showed that female sex was a risk factor for recurrence after inguinal hernia surgery with an RR of 1.38 (CI 95% = 1.28-1.48, p < 0.001): Level 2 of evidence

The higher recurrence rate in females could be due to more femoral hernias missed at the primary procedure [8].

Direct versus Indirect inguinal hernia

In the same review cited above [8], four studies evaluating primary inguinal hernias were included in a meta-analysis. It included 36 971 interventions in 35 342 patients and evaluated the risk of direct inguinal hernias (DIH) recurrence compared with indirect inguinal hernias (IIH). The meta-analysis showed that a primary DIH was a significant risk factor for recurrence compared with a primary IIH with a RR of 1.91 (CI95% = 1.62-2.26, p <0 .001). (Level 2 of evidence)

Smoking

In Burcharth's review [8] smoking was a significant risk factor of recurrence. (Level 2 of evidence)

Age

Murphy [9] reported that the older the patient, the higher the risk of recurrence was. In comparison with a population of 18 to 24 years-old, the Odds Ratio (OR) increased respectively from 1.16 for the 25-34 years-old, to 1.97 for the 45-54 years-old, to 2.06 for the 55-64 years-old, to 2.3 for the 65–74 years-old and to 2.53 when age exceeded 74 years-old. (Level 3 of evidence)

Body Mass Index (BMI)

BMI ≥ 30 was reported as a recurrence factor after total extra-peritoneal laparoscopic repair (TEP) in a prospective norvegian study [HR=3.74; p=0.026][10]. **(Level 2 of evidence)**

Surgical technique related recurrence risk factors

Non-mesh versus Mesh repair

A Cochrane systematic review published in 2009 [11] included 16 RCT. It compared the « Shouldice technique» (2566 patients) to the « Non-mesh repair » (1608 patients) and to the « mesh repair » (1221 patients). The results showed less recurrence in the « Shouldice technique group » than in the « non-mesh repair group » (other than Shouldice) [OR 0.62, CI95% (0.45 -0.85), p<0.001] and a higher recurrence rate in the « Shouldice group » than in the « mesh repair group » [OR 3.65, CI95% (1,79-7,47), p<0.001]. The mesh repair was Lichtenstein technique in five RCT and Plug method in one trial.

Non-mesh repair is a recurrence factor with a level 1 of evidence .

Laparoscopic versus open repair

A meta-analysis published in 2012 [12], included 27 randomized trials, with 7161 patients operated on for unilateral inguinal hernia by both open and laparoscopic approach. The risk of recurrence was higher in the "laparoscopic approach" group than in the "open approach" group [RR = 2.06, CI95% (1.26-3.37), p = 0.004]. The difference was not statistically significant between "open approach" group and the "Trans-abdominal pre-peritoneal approach" (TAPP) group [RR = 1.14, CI95% (0.78-1.68), p = 0.491]. The total extra-peritoneal (TEP) approach was associated with higher risk of recurrence than the « open approach » [RR = 3.75, CI95% (1.66-8.35), p = 0.001].

TEP approach is a factor of recurrence after unilateral inguinal hernia repair with a level 1 of evidence.

TAPP approach and the open approach have comparable results in terms of recurrence after unilateral inguinal hernia repair with a level 1 of evidence.

The mesh

Three randomized controlled trials compared the results between heavy-weight mesh (HWM) repair and low-weight mesh repair (LWM) [13-15]. The difference was not statistically significant in terms of recurrence in two trials where the mesh repair technique was Lichtenstein [13,14]. In Chowbey's trial [15], the LWM was associated with more recurrence after TEP.

Two meta-analyses of randomized controlled trials [16, 17] did not reveal any difference in terms of recurrence between HWM and LWM.

In the meta-analysis of Fang [18] that included six randomized trials and two cohort studies, showed no significant difference in terms of recurrence between biologic and synthetic mesh.

The mesh type does not affect hernia recurrence. Level 1 of evidence.

Seven randomized controlled trials [19-25] and 11 meta-analyses [26-36] studied the different fixation techniques of the mesh (sutures, biological glue, self-adhesive mesh, tacker, no fixation), with open and laparoscopic approach:

there was no significant difference in terms of recurrence. The mesh fixation does not affect the recurrence. Level 1 of evidence.

The hernial sac management

In a large-scale cohort study (98161 groin hernia operations registred in the Swedish Hernia Register) [37] the authors investigated the association between the different hernial sac management modalities and the reoperation rate for recurrence.

Of 98 161 groin hernia operations, 90567 (92,3%) had available data on hernial sac management: the hernial sac was invaginated in 57,7% of procedures, excised in 33,6% and divided with the distal part left in place in 8,7%.

In comparison to the sac invagination, partial and complete sac resection were associated to a lower risk of recurrence with respectively RR=0,63 [$CI^{95\%}$ =0,51-0,79, p<0.001] et RR=0,72 [$CI^{95\%}$ (0,53-0,99),p=0.047].

This study suggests that the hernial sac invagination is a factor of recurrence. Level 3 of evidence.

Recurrent groin hernia repair

After a primary non-mesh repair

In a cohort study, Bisgaard et al. [38] did not find a statistically significant difference in terms of re-operation for 2nd recurrence, between laparoscopic approach and open approach (mesh repair in both ways). In his study, Sevonius et al. [39] has noticed, in comparison to the laparoscopic approach, the slight superiority of the pre-peritoneal mesh repair to the Lichtestein and the Plug technique with respectively a Hazard Ratio equal to 1.44 (laparoscopic), 2.43 (pre-peritoneal) and 2.12 (Plug).

Recurrence after a primary non-mesh repair can be treated either by an anterior approach (Lichtenstein, Plug, Pre-peritoneal mesh) or by a posterior approach (TEP or TAPP). Level 3 of evidence, grade C of recommendation

After a primary Lichtenstein repair

In Bisgaard et al. study, the intervention rate for second recurrence was the lowest after laparoscopic approach compared with all open techniques of repair for recurrence [38]. In a cohort study, Öberg et al. compared 2nd recurrence rate between the Lichtenstein-Lichtenstein group and the Lichtenstein-Laparoscopic group, and found a statistically significant difference with a HR equal to 2.46 ($IC^{95\%}$ =1.76-3.43) in favor of laparoscopic approach [40]. This difference was noticed only when the the primary hernia was direct after subgroup analysis.

The recurrence of an indirect hernia after a primary Lichtenstein repair can be treated either by laparoscopic approach or Lichtenstein repair. We recommand to treat the recurrence of direct hernia after a primary Lichtenstein repair by laparoscopic approach. Level 3 of evidence, grade C of recommendation.

After a primary laparoscopic approach

Öberg et al. results suggest that the recurrence repair can be either a laparoscopic or Lichtenstein technique: No difference in terms of 2nd intervention was noticed between those two techniques [40]

Level 3 of evidence. Grade C of recommendation.

DISCUSION

The qualitative analysis of the literature revealed that heredity, female gender, obesity and smoking were general recurrence factors of groin hernia with a level 2 of evidence. Aging favors groin hernia recurrence with a level 3 of evidence.

Non mesh-repair and « TEP » approach for unilateral inguinal hernia favor groin hernia recurrence with a level 1 of evidence. Neither the surgical approach (laparoscopic, open), nor the mesh type and its fixation affect recurrence, with a level 1 of evidence.

The hernial sac invagination may favor groin hernia recurrence with a level 3 of evidence.

Groin hernia recurrence after a primary non-mesh repair can be treated either by an anterior or by a posterior approach with a level 3 of evidence and grade C of recommendation.

Recurrence of an indirect hernia after a primary Lichtenstein repair can be treated either by laparoscopic approach or Lichtenstein repair with a level 3 of evidence and grade C of recommendation. We recommand to treat the recurrence of direct hernia after a primary Lichtenstein repair by laparoscopic approach with a level 3 of evidence and grade C of recommendation.

After a primary laparoscopic approach, the recurrence repair can be either a laparoscopic or Lichtenstein technique with a level 3 of evidence and grade C of recommendation.

After carrying out a literature review, we found no systematic review which had the same aim of this work.

CONCLUSION

Obesity and smoking were independant hernia recurrence factors with a level 2 of evidence. This systematic review allowed us to recommand weight loss and smoking cessation for patients undergoing groin hernia surgery.

As concerns treating groin hernia recurrence, the inverted approach (anterior-posterior and posterior-anterior) recommended in the guidelines [41,42] is questionable. The choice of the adequate technique depends on the primary repair and also includes the surgeon preferences.

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