



CHARGERIE LOURDE POUR PROTHÈSE LÉGÈRE

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Jean-Pierre Cossa



PROTHÈSE MODERNE LIGHTWEIGHT



Contrôle réaction à corps étranger

- Dépendante quantité matériel implanté
- Optimisation du confort de la réparation

Diminution de la densité des prothèses

- Haute porosité (larges mailles)
- Faible surface (monofilament)

Meilleures intégration / sécurité



DONNÉES FACTUELLES OPEN



“L'utilisation de mesh LW dans la cure de hernie inguinale par la technique du Lichtenstein a démontré une diminution des douleurs chroniques et de la sensation de corps étranger, par rapport aux meshes HW. Il n'y a pas de différence significative entre les deux types de meshes sur le critère de la récurrence.”⁽⁴²⁾

Meta-Analysis 6 RCT's incluant 1936 Patients

“L'utilisation de meshes LW démontre des avantages en terme de douleur post opératoire et sur la sensation de corps étranger.”⁽⁴³⁾

Meta-Analysis 16 RCT's + 5 études comparatives incluant 5389 Patients



UZZAMAN ET AL; BR J SURG. 2012 JAN;99(1):29-37. DOI: 10.1002/BJS.7718. EPUB 2011
LI J ET AL; HERNIA. 2012 OCT;16(5):529-39. DOI: 10.1007/S10029-012-0928-Z. EPUB 2012

DONNÉES FACTUELLES TAPP /TEP

Littérature non concluante : no pain

2-5% douleur quotidienne

- Recul moyen 2 ans (1-14 ans)
- Seulement 0,4% centre anti-douleur

Douleur non-neuropathique

- Préservation nerveuse plus sécurisée
- Mécanisme nociceptif inflammatoire-dépendant
- Intérêt d'une imagerie post-op précise

Hernia (2011) 15:521–529
DOI 10.1007/s10029-011-0815-z

ORIGINAL ARTICLE

Neurophysiological characterization of persistent pain after laparoscopic inguinal hernia repair

G. Linderoth · H. Kehlet · E. K. Aasvang · M. U. Werner

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Abstract

Purpose About 2–5% of patients undergoing laparoscopic inguinal repair experience persistent pain influencing everyday activities. However, compared with persistent pain after open repair, the combined clinical and neurophysiological characteristics have not been described in detail. Thus, the aim of the study was to describe and classify patients with severe persistent pain after laparoscopic herniorrhaphy.

Methods Eleven patients with severe persistent pain following laparoscopic inguinal herniorrhaphy were assessed in detail by their medical history, questionnaires (impairments of daily activities, pain description, psychological parameters, socio-economic status), physical examination, sensory mapping, and quantitative sensory testing.

Results The median time since operation was 2 years (range 1–14 years). Ten patients experienced pain in the inguinal region and five patients had pain outside the inguinal region. Based upon the clinical pain pattern and the

detailed quantitative sensory testing, the patients could be separated into three different entities, suggesting different pathogenic mechanisms leading to the persistent pain state. Four patients experienced dysejaculation. Six patients were unemployed or retired due to the postherniorrhaphy pain.

Conclusions These results suggest that patients with severe persistent pain after laparoscopic inguinal herniorrhaphy belong to distinctive subgroups with indicators of either neuropathic, inflammatory, or mechanical irritation from the mesh, or a combination of these symptoms. The findings of a number of pain localizations outside the inguinal region demarcate it from persistent pain following open groin hernia repair. A classification based on a larger study group is required in order to define mechanism-based treatment strategies.

Keywords Chronic pain · Herniorrhaphy · Laparoscopic surgery · Postoperative pain · Neuropathic pain

Introduction

Laparoscopic inguinal hernia repair may have advantages in terms of faster postoperative recovery and less expected persistent pain than after open repair [1–6]. However, about 2–5% of patients may still suffer from persistent pain influencing everyday activities, and about 0.4% are referred to pain clinics [7]. To our knowledge, patients with severe persistent pain after laparoscopic herniorrhaphy have not been characterized in detail, including physical examination, psychosocial evaluations, and quantitative sensory testing, similar to data from open groin hernia repair [8, 9]. The aim of this study was, therefore, to describe and characterize severe persistent pain after laparoscopic inguinal herniorrhaphy.

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The Radiologic Appearance of Prosthetic Materials Used in Hernia Repair and a Recommended Classification

Srdjan Rakic¹ and Karl A. LeBlanc² [Share](#)**Affiliations:** ¹ Department of Surgery, Hospital Group Twente, Zilvermeeuw 1, Almelo 7600 SZ, The Netherlands.² Surgeons Group of Baton Rouge, Our Lady of the Lake Physician Group, Baton Rouge, LA.**Citation:** American Journal of Roentgenology. 2013;201: 1180-1183. 10.2214/AJR.13.10703[Abstract](#) | [Full Text](#) | [Figures](#) | [References](#) | [PDF](#) | [PDF Plus](#) | [Add to Favorites](#) | [Permissions](#) | [Download Citation](#)

ABSTRACT

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OBJECTIVE. This article analyzes radiopaque properties of meshes currently used in hernia surgery. A search was conducted using PubMed and a combination of the terms "hernia repair," "mesh," "laparoscopy," "CT," "MRI," "radiopaque," and "high-resolution techniques."

CONCLUSION. The visibility of meshes varies from not visible at all (e.g., Ultrapro), to hardly discernible (Prolene), to readily seen (Composix), and finally to the always visible (Dualmesh). Radiopaque properties of meshes have



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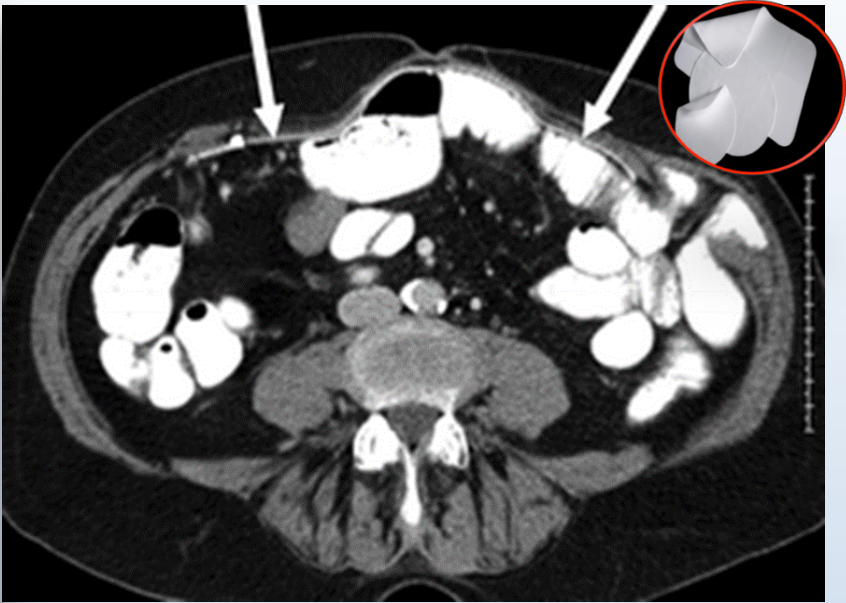
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Articles citing this article:

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TABLE I: Radiopaque Properties of Meshes Commonly Used in Hernia Repair

Mesh Brand Name (Manufacturer), Reference	Imaging Modality	Radiopaque Properties
Surgipro (Covidien), [1] and authors' own experience	CT	Not visible
Prolene (Ethicon)	CT	Not visible
[2, 3] and authors' own experience	MRI	Indirectly visible
[4]	CT	Indirectly visible
PHS (Ethicon), [5]	CT	Indirectly visible
Marlex (Bard Davol)	CT	Indirectly visible in 20–39% of cases
[6] and authors' own experience	MRI	Not or poorly visible
Authors' own experience		
Composix (Bard Davol)		
[1]	CT	Visible in one case (of unspecified total)
[7]	CT	Not visible
[8]	CT	Visible
Proceed (Ethicon)		
[2] and authors' own experience	CT	Not visible
[9]	CT	"Can be seen"
Parietene (Covidien), [10, 11]	CT	Not visible
Polyester (not specified), [12, 13]	CT and MRI	Not visible
Parietex Composite (Sofradim)		
[14, 15]	CT	Indirectly visible
Authors' own experience	CT	Not visible
[16]	MRI	Not visible
Dualmesh (Gore)		
[17–21]	CT	Visible
[15, 16]	MRI	Visible
Vypro (Ethicon), [15, 16]	MRI	Not visible
Ultrapro (Ethicon), [3, 22]	CT	Not visible
Intramesh W3 (Cousin), [23]	MRI	Visible (unclear whether it is directly visible)
TiMesh (Biomet), [24]	CT	Unclear
Ventralux (Bard Davol), [25, 26]	CT	Visible (unclear whether it is directly visible)



A

B

Iterations

C

Porosity:
 textile 68%
 effective 42%

D

5 mm

Legend:

- suture
- local tissue
- Inflammatory granuloma or scar tissue

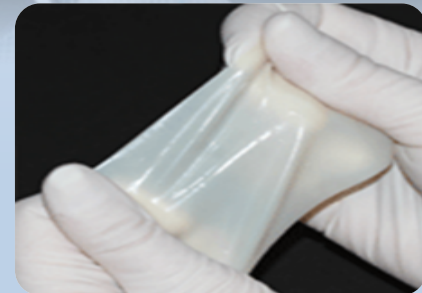
EPAISSEUR DE LA PROTHÈSE IMPLANTÉE

Logiquement liée à la visibilité

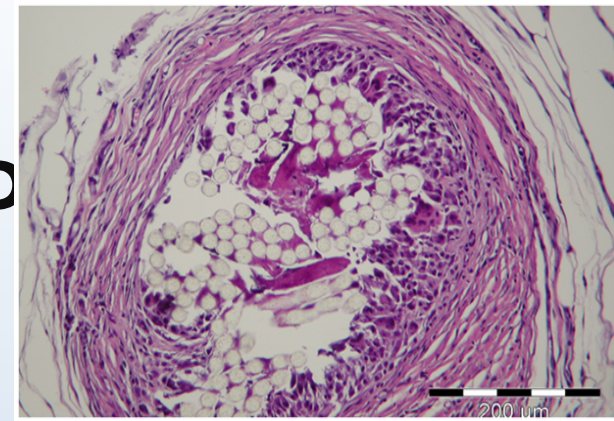
- PTFE 1,5mm (Gore) > PTFE 1mm (Cousin, Bard)
- Prolène (J&J) > Ultrapro, Vypro (J&J)

Peu dépendante de couches bifaces

- A visée d'intégration ou anti-adhérentielle
- Couche très mince
- Peu d'impact sur comportement radiologique



RÉACTION À CORPS ÉTRANGER



Intensité de la réaction inflammatoire

- Conditionne le dépôt de collagène
- Épaisseur de colonisation conjonctive

Marqueur indirect de la surface prothétique

- Difficilement détectable à la lecture routinière
- Nécessite habitude et formation spécifique
- Tributaire d'une information clinique précise



CLASSIFICATION VISIBILITÉ RADIOLOGIQUE



Labellisation de packaging

- Composition
- Porosité

Visibilité / quatre classes

- Visibilité précise
- Visibilité floue
- Visibilité indirecte
- Visibilité nulle ou quasi-nulle

VISIBILITÉ PRÉC



Dualmesh et Dualmesh PLUS (Gore)

Raisons:

- Polytétrafluoroéthylène expansé
- Structure homogène non tissée non tricotée
- Épaisseur (1; 1,5 ou 2mm)

Mesures précises

- Dimensions, positionnement, marges
- Surveillance shrinkage

VISIBILITE FLO



Composix, Ventralex, Intramesh T1, Dulex

Raisons:

- PTFE plus fin (<0,20mm)
- Plus ou moins visible si non spécifiquement recherchées

Mesures précises non fiables

- Double lecture non reproductible

VISIBILITE INDI



Prothèses enrobées (Parietex Composite, Proceed, Sepramesh, Intramesh W3, Dynamesh, Timesh) et prothèses lourdes (PP ou PE)

Raisons:

- Iso-atténuation relative au muscle
- Mais intensité de la réaction à CE

Mesures précises non réalisables

VISIBILITE NULLE



Prothèses légères (Ultrapro, Vypro, Physiomesh...)

Raisons QS

Aucune mesure, aucune identification directe

- Douleur chronique
- Bombement orificiel
- Suspicion de récidence

CONTRÔLE POST-OPÉRATOIRE

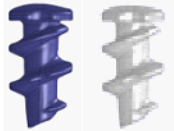


Echographie

- Confidentielle, opérateur-dépendante
- Peu précise

Imagerie lourde (à haute résolution)

- TDM, IRM
- Tributaire de la visibilité prothétique
- Affaiblie par les fixations modernes

Absorbatack	Permasorb	Sorbafix/Permafix	ETHICON SECURESTRAP™
Covidien	Bard / Davol	Bard Davol	ETHICON
			



PLACE / RÔLE D

Centre de référence (1 200 TEP/an)

- Extraction janvier 2011-juillet 2012
- 53 patients isolés pour douleur > 3 mois
- IRM de contrôle avec double lecture croisée
- 47 avec prothèses non fixées, 5 nc, 1 tackler

Check-liste diagnostique

- 106 aines examinées: 67 opérées, 39 non (14 Bilat)
- IRM au repos et avec Valsalva
- Hernie, Bulging, Lipome, Meshome, Tendinite, Autre organe
- Fibrose absente, mineure, moyenne, extensive



Hernia (2016) 20:55–62
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ORIGINAL ARTICLE

Chronic pain after TEP inguinal hernia repair, does MRI reveal a cause?

J. P. J. Burgmans¹ · C. E. H. Voorbrood¹ · T. Van Dalen¹ · R. N. Boxhoorn² · G. J. Clevers¹ · F. B. M. Sanders² · D. B. J. Naafs² · R. K. J. Simmermacher³

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Abstract

Purpose Persistent pain is a known side effect after TEP inguinal repair disabling 2–5 % of patients. A standardized diagnostic work-up so far is not available. MRI is a diagnostic tool in the work-up of inguinal hernias. In the present study the yield of MRI in evaluating chronic pain after TEP hernia repair is addressed.

Methods In our database patients receiving an MRI scan for groin pain lasting more than 3 months after TEP inguinal hernia repair were identified. A checklist with potential pathologic findings was filled out for each groin by two blinded observers. Findings in painful, pain-free and unoperated groins were compared and statistical analysis done based upon their relative incidences. Cohen's kappa coefficients were calculated to determine interobserver agreement.

Results Imaging studies of 53 patients revealed information regarding 106 groins. Fifty-five groins were painful after the initial operation, 12 were pain-free postoperatively and 39 groins were not operated. None of the pre-defined disorders was observed statistically more often in the patients with painful groins. Only fibrosis appeared more prevalent in patients with chronic pain ($P = 0.11$). Interobserver agreement was excellent for identifying the

mesh ($\kappa = 0.88$) and observing bulging or a hernia ($\kappa = 0.74$) and was substantial for detecting fibrosis ($\kappa = 0.63$). In 40 % of the patients, MRI showed a correct mesh position and observed nothing else than minor fibrosis. A wait and see policy resolved complaints in the majority of the patients. In 15 % of the patients, MRI revealed treatable findings explanatory for persisting groin pain.

Conclusion For patients with post-TEP hernia groin pain, MRI is useful to confirm a correct flat mesh position and to identify possible not operation-related causes of groin pain. It is of little help to identify a specific cause of groin repair-related pain.

Keywords Inguinal hernia · Endoscopic · TEP · Chronic pain · MRI

Introduction

Currently morbidity associated with inguinal hernia repair consists of chronic post-operative inguinal and genital pain rather than recurrences. Chronic pain can be debilitating, leading to costly multidisciplinary medical consultations [1]. Endoscopic techniques reduce the occurrence of post-operative pain compared to other groin hernia repair techniques, but still result in approximately 2–5 % of patients having pain every day [2–5].

So far no diagnostic work-up has been defined to evaluate patients with chronic post-operative pain after groin hernia surgery. Types of pain and their estimated duration after hernia surgery are well defined [6]. In general, pain is categorized into two groups: neuropathic pain, defined as pain caused by direct nerve injury characterized by various types of sensory dysfunction in the surgical area and non-

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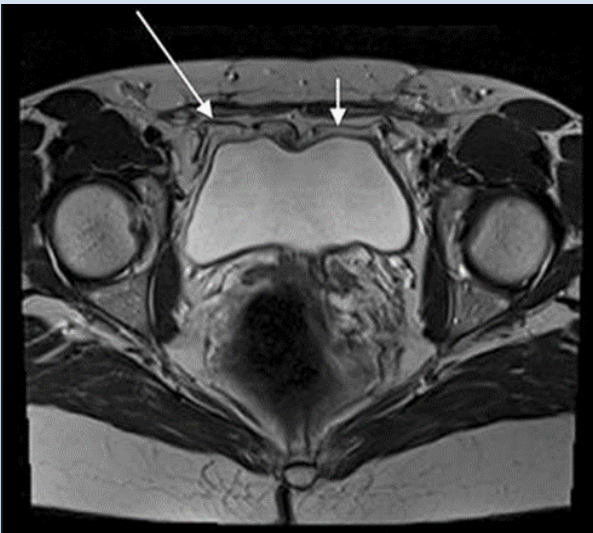
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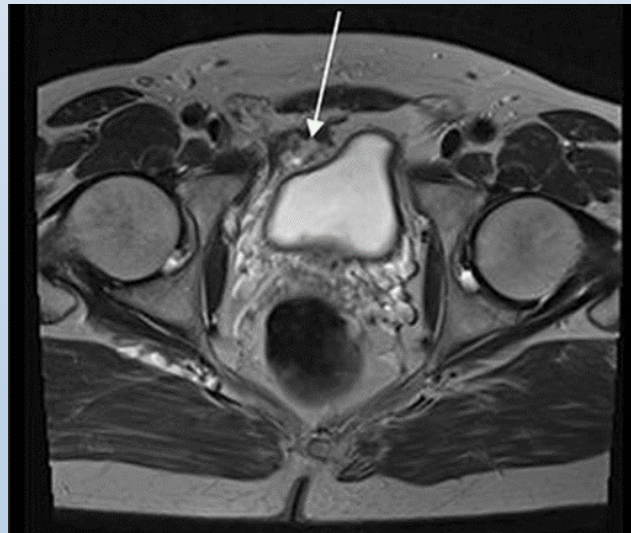


FIBROSE INGUINALE

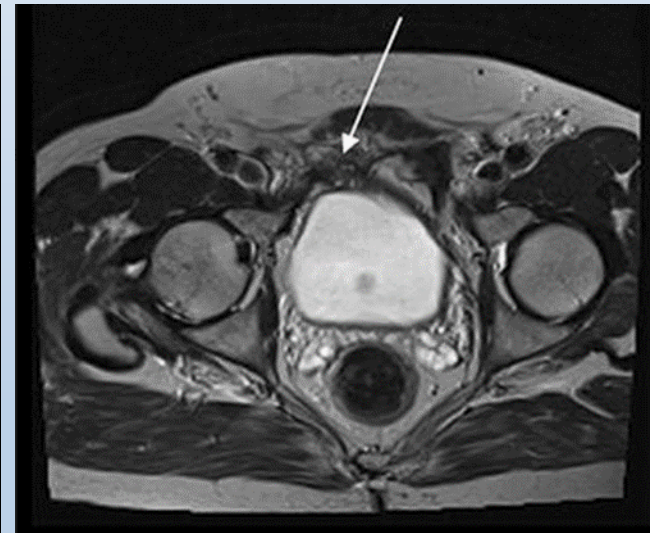
Coupes T2 coronales et axiales, puis coupes T1 3D avec fatsat



modérée



moyenne



extensive

FIBROSE: 56% - EXTENSIVE: 33%

Anomalie la plus fréquemment observée

- Différence Significative Côté opéré / non opéré ($p < 0,00$)
- Tendance différence Côté dlx / non dlx ($p = 0,11$)
- Donnée évolutive avec la chronologie post-op

Prothèse: Variable significative

- Fibrose moyenne à extensive
- Prolène HW (13/26) > Ultrapro LW (1/14) ($p = 0,02$)
- Petits effectifs, délais inhomogènes, saisies rétrospectives

Burgmans JP

Long-term Results of a Randomized Double-blinded Prospective Trial of a Lightweight (Ultrapro) Versus a Heavyweight Mesh (Prolene) in Laparoscopic Total Extraperitoneal Inguinal Hernia Repair (TULP-trial).

Ann Surg 2016 May ;263(5):862-6

EVALUATION REGION INGUINALE

Côté opéré: bonne visibilité prothétique

- Majorité des cas (majorité prothèse HW)
- Respect du protocole de double-lecture
- Littérature modeste et discordante

Côté non opéré: bonne sensibilité diagnostique

- 36% hernies controlatérales détectées
- Double-lecture / IRM dynamique
- Littérature incertaine 13-51%

Intérêt pour le patient

- Objectiver l'absence de récurrence et permettre temporisation
- Si anomalie: diagnostic difficile entre bulging, lipome ou récurrence

RESULTATS

40% patients calmés par IRM normale

36% en consultation anti-douleur

77% résolution après 4mois post IRM

15% patients traités après IRM anormale

3/8 réopérés (1 récive, 2 lipomes)

Table 3 Treatment and outcome of patients with painful operated groins ($n = 53$)

Policy	Patients	Treatment	LTFU	No/acceptable pain at the end of FU	MRI pathology (as observed by both observers)
Wait and see	21 (40)	21 no treatment	1	20/20	19 no or minor fibrosis One oedema spermatic cord One bulging and hernia or bulging
Pain clinic referral	19 (36)	Four no treatment 11 injections Three neuromodulation	5	14/14	Eight no or minor fibrosis Seven extensive fibrosis One meshoma and extensive fibrosis One bursitis iliopsoas One lipoma One hernia or bulging
Physiotherapy	6	One no treatment Two physiotherapy One pain clinic	2	3/4	Three no or minor fibrosis One extensive fibrosis and adductor tendinitis One hernia or bulging and adductor tendinitis One meshoma and extensive fibrosis and hernia or bulging
Reoperation	3	Three hernia reoperation		3/3	One hernia One hernia or bulging and prostate cancer One funicular lipoma
Neurology referral	1	One pain clinic	1	n.a.	One no or minor fibrosis
Urology referral	2 ^a	One prostate resection One hernia reoperation	1	1/1	Two prostate cancer
Orthopedics referral	1	One medical treatment	1	n.a.	One no or minor fibrosis
Gynecology referral	1	One no treatment	1	n.a.	One no or minor fibrosis

Median follow-up was 4 months; MRI signs of moderate to severe fibrosis were grouped as extensive fibrosis. No/acceptable pain was defined as pain not interfering with daily life (as reported by the patient)

LTFU lost to follow-up, n.a. no information available

^a one patient was operated because of a recurrent hernia and referred to the urologist because of prostate cancer

AVANTAGES



Document objectif d'acquisition aisée

- Pour le patient et pour le praticien
- Pour le responsable d'essais cliniques
- Pour l'expert médico-légal

Mesure précise

- Shrinkage secondaire pour surveillance
- Adhérences viscérales si symptômes digestifs
- Repérage topographique pour chirurgie ultérieure
- Positionnement trocarts de coelio



ALTERNATIVES



Marquage de la surface prothétique

- Clips angulaires métalliques ou en titanium (1)
- Imprégnation des bordures par Barium (2)
- Pointillage par oxydes de fer superparamagnétique (3)

Pas en pratique routinière...

(1) [Surg Endosc.](#) 2011 Mar;25(3):749-55. doi: 10.1007/s00464-010-1246-0. Epub 2010 Jul 23. **Mesh shrinkage and pain in laparoscopic ventral hernia repair: a randomized clinical trial comparing suture versus tack mesh fixation.** [Beldi G¹](#), [Wagner M](#), [Bruegger LE](#), [Kurmman A](#), [Candinas D](#).

(2) [Int Braz J Urol.](#) 2010 Mar-Apr;36(2):209-14; discussion 215-7. **Dynamic evaluation of pelvic floor reconstructive surgery using radiopaque meshes and three-dimensional helical CT.** [Palma P¹](#), [Ricetto C](#), [Fraga R](#), [Miyaoaka R](#), [Prando A](#).

(3) [Surg Endosc.](#) 2012 May;26(5):1468-75. doi: 10.1007/s00464-011-2057-7. Epub 2011 Dec 17. **In vivo MRI visualization of mesh shrinkage using surgical implants loaded with superparamagnetic iron oxides.** [Kuehnert N¹](#), [Kraemer NA](#), [Otto J](#), [Donker HC](#), [Slabu I](#), [Baumann M](#), [Kuhl CK](#), [Klinge U](#)

LABELLISATION EHS



Résistance

- Supérieure à 252 N et stable dans le temps

Elasticité

- Proche de celle de la paroi abdominale 20-30% à un couple de 16 N/cm

Porosité

- Importante, au moins 60%

Surface

- Faible, en privilégiant le monofilament



Visibilité

- Réflexion à mener avec l'industrie

