



## Herniorraphy 2004

### Summary Recommendations

#### Notes on PROSPECT recommendations

The recommendations of the *PROSPECT Working Group* are graded A–D, based on the level of evidence from the studies, which is in accordance with the Oxford Centre for Evidence-Based Medicine (CEBM website accessed Dec 2003, Sackett 2000). In the context of PROSPECT, recommendations based on procedure-specific evidence are grade A (randomised clinical trials), those based on transferable evidence are grade B (randomised clinical trials) or grade C (retrospective studies or case series) and those based on clinical practice are grade D ([Appendix A: Levels of evidence and grades of recommendation](#)).

PROSPECT provides clinicians with supporting arguments for and against the use of various interventions in postoperative pain based on published evidence and expert opinion. Clinicians must make judgements based upon the clinical circumstances and local regulations. At all times, local prescribing information for the drugs referred to must be consulted.

## Summary recommendations

The following pre-, intra- and postoperative interventions have been evaluated for the management of postoperative pain following herniorrhaphy:

### **PRE-OPERATIVE**

#### ***Recommended***

##### ***Systemic***

- **Conventional NSAIDs (Grade A) or COX-2-selective inhibitors (Grade A)**

##### ***Local anaesthetic techniques***

- **Inguinal nerve block/field block/infiltration, pre-operatively and/or intra-operatively (Grade A)**
- **Long-acting local anaesthetics (Grade D)**

#### ***Not recommended***

##### ***Systemic***

- Clonidine (Grade D)
- Corticosteroid (Grade D)
- Gabapentin/pregabalin (Grade D)
- Ketamine (Grade D)

##### ***Local anaesthetic techniques***

- Epinephrine (Grade A), dextran (Grade D) or corticosteroid (Grade D) as part of a local anaesthetic solution
- Paravertebral nerve block (Grade D)

##### ***Other local analgesics***

- Wound infiltration with clonidine (Grade D)
- Wound infiltration with conventional NSAIDs (Grade A)
- Topical conventional NSAIDs (Grade D)

## **INTRA-OPERATIVE**

### ***Recommended***

#### ***Local anaesthetic techniques***

- Inguinal nerve block/field block/infiltration, pre-operatively and/or intra-operatively (Grade A)
- Long-acting local anaesthetics (Grade D)

#### ***Operative anaesthetic techniques***

- Local anaesthesia ± sedation OR general anaesthesia in combination with local anaesthetic techniques (inguinal nerve block/field block/infiltration) (Grade A)
- Long-acting local anaesthetics (Grade D)

#### ***Operative techniques***

- Open or laparoscopic surgery (Grade D)
- Mesh techniques (Grade A) – no recommendations for one particular open mesh technique, prosthesis type or mesh fixation technique over another due to limited available pain data

### ***Not recommended***

#### ***Systemic***

- Clonidine (Grade D)
- Gabapentin/pregabalin (Grade D)
- Ketamine (Grade D)

#### ***Local anaesthetic techniques***

- Epinephrine (Grade A), dextran (Grade D) or corticosteroid (Grade D) as part of a local anaesthetic solution
- Local anaesthetic instillation (no needles) at closure (Grade D)
- Extraperitoneal instillation of local anaesthetic during laparoscopic surgery (Grade A)
- Paravertebral nerve block (Grade D)

#### ***Other local analgesics***

- Wound infiltration with clonidine (Grade D)
- Wound infiltration with conventional NSAIDs (Grade A)
- Wound infiltration with strong opioid (Grade A)

#### ***Operative anaesthetic techniques***

- Epidural anaesthesia (Grade D)
- Spinal anaesthesia (Grade D)

#### ***Operative techniques***

- Open non-mesh surgery (Grade A)

#### ***Nerve section/cryoanalgesia techniques***

- Surgical division of the ilioinguinal nerve (Grade A)
- Cryoanalgesia (Grade A)

## POSTOPERATIVE

### *Recommended*

#### *Systemic*

- Conventional NSAIDs (grade A) or COX-2-selective inhibitors (grade A)
- Paracetamol, for routine pain therapy in combination with conventional NSAIDs/COX-2-selective inhibitors (Grade B)
- Weak opioids for moderate-intensity pain when conventional NSAIDs/COX-2-selective inhibitors plus paracetamol are not sufficient or are contraindicated (Grade B)
- Strong opioids as rescue analgesia only (for high-intensity pain), in addition to non-opioid analgesia (Grade B)

### *Not recommended*

#### *Systemic*

- Gabapentin/pregabalin (Grade D)
- Ketamine (Grade D)

#### *Local anaesthetic techniques*

- Continuous infusion with local anaesthetic by a catheter in the wound (Grade D)
- Single/repeat dose of local anaesthetic by a catheter in the wound (Grade A)
- Postoperative subcutaneous infiltration with local anaesthetic (Grade D)

#### *Non-pharmacological techniques*

- TENS (Grade A)

## Overall Recommendations: Pain Management for Herniorraphy

<b>Recommended</b>	
<b>Pre-/intra-operative</b>	<ul style="list-style-type: none"> <li>• Local anaesthesia ± sedation OR general anaesthesia in combination with local anaesthetic techniques (inguinal nerve block/field block/infiltration)</li> <li>• Long-acting local anaesthetics in preference to short-acting local anaesthetics</li> <li>• Open or laparoscopic surgery, depending on factors other than postoperative pain</li> <li>• Mesh techniques in preference to non-mesh techniques</li> </ul>
<b>Postoperative 0–6 hours (including the post anaesthetic care unit [PACU])</b>	<p>For postoperative analgesia in addition to that provided by intra-operative local anaesthetics:</p> <ul style="list-style-type: none"> <li>• Base medication: conventional NSAIDs or COX-2-selective inhibitors (use weak opioids when conventional NSAIDs/COX-2-selective inhibitors are contraindicated), combined with paracetamol</li> <li>• Add weak opioid when VAS&gt;30&lt;50*</li> <li>• Add strong opioid when VAS&gt;=50*</li> </ul>
<b>Postoperative Beyond 6 h</b>	<ul style="list-style-type: none"> <li>• Continue base medication: conventional NSAIDs or COX-2-selective inhibitors (use weak opioids when conventional NSAIDs/COX-2-selective inhibitors are contraindicated), combined with paracetamol</li> <li>• Add weak opioid when VAS&gt;30&lt;50*</li> <li>• Add strong opioid when VAS&gt;=50*</li> </ul>

# Evidence review process

## Details of systematic literature review

### *Literature search*

Systematic review of the literature from 1966–January 2004 using MEDLINE and EmbASE, following the protocol of the Cochrane Collaboration:

- Inclusion of randomised studies in English assessing analgesic interventions in inguinal herniorrhaphy in adults, and reporting pain on a linear analogue scale
- Identification of 243 studies of peri-operative interventions for postoperative pain following inguinal herniorrhaphy
- 120 studies included ([Appendix B: Herniorrhaphy: Included studies](#))
- 123 studies excluded ([Appendix C: Excluded references](#))
- The most common reason for exclusion was the absence of postoperative pain scores (77 studies). Studies of analgesic interventions following laparoscopic herniorrhaphy (four studies) were excluded from the systematic review because there is evidence that laparoscopic herniorrhaphy is associated with a different postoperative pain profile to open herniorrhaphy (see Intra-operative, Operative techniques). These laparoscopic herniorrhaphy studies are presented as transferable evidence. ([Appendix D: Reasons for exclusion](#))

# Appendix

## A. Levels of evidence and grades of recommendation

### Sources of evidence in PROSPECT

The evidence for prospect is derived from three separate sources, and this evidence is considered by the **prospect** Working Group to determine the prospect recommendations:

- Procedure-specific evidence derived from the systematic reviews of the literature
- ▲ Transferable evidence from comparable procedures identified by the members of the prospect Working Group
- Current practice – A commentary on each of the interventions from the members of the prospect Working Group
- ◆ Practical prospect recommendations are based on all the information

### PROSPECT grades of recommendation

The recommendations of the PROSPECT Working Group are graded A–D, based on the level of evidence from the studies, which is in accordance with the Oxford Centre for Evidence-Based Medicine (CEBM website accessed Dec 2003, Sackett 2000) (see table below) (<http://www.cebm.net>)

In the context of PROSPECT, grades of recommendation are dependent on whether the evidence is from specific studies, transferable studies or clinical practice:

- Specific evidence – grade A
- ▲ Transferable evidence – grade B/C
- Clinical practice – grade D

### CEBM grades of recommendation

Study criteria	Level of evidence	Criteria for grading of recommendation	Grade of recommendation
Systematic review (with homogeneity) of randomised, controlled trials	1a	Consistent level 1 studies	A
Individual, randomised, controlled trials with statistically significant results	1b		

All or none, i.e. prior to availability of new therapy, all died, now with therapy some survive; or, prior to therapy some died, now with therapy none die	1c		
Systematic review (with homogeneity) of cohort studies	2a	Consistent level 2 or 3 studies (or extrapolations* from level 1 studies)	<b>B</b>
Individual cohort study (including low quality randomised controlled trial, e.g. <80% follow up)	2b		
Outcomes research	2c		
Systematic review (with homogeneity) of case-controlled studies	3a		
Individual case-controlled study	3b		
Case-series, and poor quality cohort and case-controlled studies	4	Level 4 studies (or extrapolations* from level 2 or 3 studies)	<b>C</b>
Expert opinion without explicit critical appraisal, or based on physiology, bench research or first principles	5	Level 5 evidence (or troublingly inconsistent or inconclusive studies of any level)	<b>D</b>

\*Extrapolations: Data used in a situation that has potentially clinically important differences to the original study situation. In the case of PROSPECT, extrapolation largely refers to transferable evidence.

## B. Herniorrhaphy: Included studies

120 studies included:

1. Aasbo V, Thuen A, Raeder J. Improved long-lasting postoperative analgesia, recovery function and patient satisfaction after inguinal hernia repair with inguinal field block compared with general anesthesia. *Acta Anaesthesiol Scand* 2002;46(6):674–678.
2. Abu-Own A, Onwudike M, Haque KA, Barker SG. Primary inguinal hernia repair utilizing the mesh 'plug' technique. *Ambulatory Surgery* 2000;8(1):31–35.
3. Aida S, Baba H, Yamakura T, Taga K, Fukuda S, Shimoji K. The effectiveness of preemptive analgesia varies according to the type of surgery: a randomized, double-blind study. *Anesth Analg* 1999;89(3):711–716.
4. Armstrong DN, Kingsnorth AN. Local anaesthesia in inguinal herniorrhaphy: influence of dextran and saline solutions on duration of action of bupivacaine. *Ann R Coll Surg Engl* 1986;68(4):207–208.
5. Barth RJ, Jr., Burchard KW, Tosteson A, Sutton JE, Jr., Colacchio TA, Henriques HF, Howard R, Steadman S. Short-term outcome after mesh or shouldice herniorrhaphy: a randomized, prospective study. *Surgery* 1998;123(2):121–126.
6. Bay-Nielsen M, Knudsen MS, Christensen JK, Kehlet H. [Cost analysis of inguinal hernia surgery in Denmark]. *Ugeskr Laeger* 1999;161(38):5317–5321.
7. Bays RA, Barry L, Vasilenko P. The use of bupivacaine in elective inguinal herniorrhaphy as a fast and safe technique for relief of postoperative pain. *Surg Gynecol Obstet* 1991;173(6):433–437.
8. Beets GL, Dirksen CD, Go PMNYH, Geisler FEA, Baeten CGMI, Kootstra G. Open or laparoscopic preperitoneal mesh repair for recurrent inguinal hernia? A randomized controlled trial. *Surg Endosc* 1999;13(4):323–327.
9. Ben-David B, Baune-Goldstein U, Goldik Z, Gaitini L. Is preoperative ketorolac a useful adjunct to regional anesthesia for inguinal herniorrhaphy? *Acta Anaesthesiol Scand* 1996;40(3):358–363.
10. Berndsen F, Arvidsson D, Enander LK, Leijonmarck CE, Wingren U, Rudberg C, Smedberg S, Wickbom G, Montgomery A. Postoperative convalescence after inguinal hernia surgery: prospective randomized multicenter study of laparoscopic versus shouldice inguinal hernia repair in 1042 patients. *Hernia* 2002;6(2):56–61.
11. Bessell JR, Baxter P, Riddell P, Watkin S, Maddern GJ. A randomized controlled trial of laparoscopic extraperitoneal hernia repair as a day surgical procedure. *Surg Endosc* 1996;10(5):495–500.
12. Bostanci BE, Tetik C, Ozer S, Ozden A. Posterior approaches in groin hernia repair with prosthesis: open or closed. *Acta Chir Belg* 1998;98(6):241–244.
13. Bringman S, Ramel S, Heikkinen TJ, Englund T, Westman B, Anderberg B. Tension-free inguinal hernia repair: TEP versus mesh-plug versus Lichtenstein: a prospective randomized controlled trial. *Ann Surg* 2003;237(1):142–147.
14. Buggedo GJ, Carcamo CR, Mertens RA, Dagnino JA, Munoz HR. Preoperative percutaneous ilioinguinal and iliohypogastric nerve block with 0.5% bupivacaine for post-herniorrhaphy pain management in adults. *Reg Anesth* 1990;15(3):130–133.

15. Callesen T, Bech K, Andersen J, Nielsen R, Roikjaer O, Kehlet H. Pain after primary inguinal herniorrhaphy: influence of surgical technique. *J Am Coll Surg* 1999;188(4):355–359.
16. Callesen T, Bech K, Thorup J, Andersen J, Nielsen R, Roikjaer O, Kehlet H. Cryoanalgesia: effect on postherniorrhaphy pain. *Anesth Analg* 1998;87(4):896–899.
17. Cameron AE, Cross FW. Pain and mobility after inguinal herniorrhaphy: ineffectiveness of subcutaneous bupivacaine. *Br J Surg* 1985;72(1):68–69.
18. Cashman JN, Jones RM, Foster JM, Adams AP. Comparison of infusions of morphine and lysine acetyl salicylate for the relief of pain after surgery. *Br J Anaesth* 1985;57(3):255–258.
19. Champault GG, Rizk N, Catheline JM, Turner R, Boutelier P. Inguinal hernia repair: totally preperitoneal laparoscopic approach versus Stoppa operation: randomized trial of 100 cases. *Surg Laparosc Endosc* 1997;7(6):445–450.
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21. Danielsson P, Isacson S, Hansen MV. Randomised study of Lichtenstein compared with Shouldice inguinal hernia repair by surgeons in training. *Eur J Surg* 1999;165(1):49–53.
22. de los Santos AR, Di Girolamo G, Marti ML. Efficacy and tolerance of lysine clonixinate versus paracetamol/codeine following inguinal hernioplasty. *Int J Tissue React* 1998;20(2):71–81.
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27. Dirksen CD, Beets GL, Go PM, Geisler FE, Baeten CG, Kootstra G. Bassini repair compared with laparoscopic repair for primary inguinal hernia: a randomised controlled trial. *Eur J Surg* 1998;164(6):439–447.
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30. Ejlersen E, Andersen HB, Eliassen K, Mogensen T. A comparison between preincisional and postincisional lidocaine infiltration and postoperative pain. *Anesth Analg* 1992;74(4):495–498.
31. Elliott S, Eckersall S, Fligelstone L, Jothilingam S. Does the addition of clonidine affect duration of analgesia of bupivacaine wound infiltration in inguinal hernia surgery? *Br J Anaesth* 1997;79(4):446–449.

32. Erichsen CJ, Vibits H, Dahl JB, Kehlet H. Wound infiltration with ropivacaine and bupivacaine for pain after inguinal herniotomy. *Acta Anaesthesiol Scand* 1995;39(1):67–70.
33. Fenton-Lee D, Riach E, Cooke T. The use of a local anaesthetic wound perfusion device versus oral analgesia. A comparison in day case inguinal herniorrhaphy. *British Journal of Intensive Care* 1994;4(5).
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123 studies excluded:

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#### D. Reasons for exclusion

<b>Study</b>	<b>Reason for exclusion</b>
Abuzaid H 2003	No analysis of herniorrhaphy subgroup
Adams HA 1991	Not English
Aitola P 1998	No VAS pain assessment
Alsarrage SAM 1990	No VAS pain assessment
Andersson B 2003	VAS pain data not reported
Arroyo A 2001	No VAS pain assessment
Azurin DJ 1996	No VAS pain assessment
Baker SBC 1980	No VAS pain assessment
Barkun JS 1995	No VAS pain assessment
Behnia R 1992	No VAS pain assessment
Berliner SD 2000	No VAS pain assessment
Brygel M 1985	Not a comparative study
Cheng J-K 1999	No VAS pain assessment
Connelly NR, Reuben SS et al 1997	
Connelly NR, Reuben SS et al 1999	
Corbitt Jr JD 1991	Not a comparative study
Cunniffe MG 1998	No analysis of herniorrhaphy subgroup
Deans GT 1995	No VAS pain assessment
Deans GT 1998	Laparoscopic herniorrhaphy
Dunn DC 1994	Not randomised
Edwards AE 1984	No VAS pain assessment
Edwards AE 1990	No VAS pain assessment
Ellis FR 1977	No VAS pain assessment
Erdem E 2003	Not appropriately randomised
Ezri T 1998	No VAS pain assessment
Fellows IW 1985	No VAS pain assessment
Fernández-V AS 1999	Not English
Ferzli G 1993	No VAS pain assessment
Fierro G 1997	No VAS pain assessment
Fitzgibbons RJ 1995	No VAS pain assessment

Fitzgibbons RJ 2003	Description of trial design
Flaherty GG 1978	No analysis of herniorrhaphy subgroup
Friis E 1996	No VAS pain assessment
Garcia LM 1980	Not a comparative study
Gardiner AS 1971	No VAS pain assessment
Ghabash M 1997	No VAS pain assessment
Gilbert HW 1990	No VAS pain assessment
Godfrey PJ 1981	No VAS pain assessment
Gratadour P 1997	No VAS pain assessment
Guillen J 1970	No VAS pain assessment
Guzman-Valdivia Gomez G 2003	No VAS pain assessment
Hashemi K 1983	No VAS pain assessment
Helbling C 2003	No VAS pain assessment
Hetzer FH 1999	No VAS pain assessment
Hirano T 1993	Not a comparative study
Ho YH 1990	Not a comparative study
Jenkinson C 1995	No VAS pain assessment
Job CA 1979	No VAS pain assessment
Johansson B 1999	VRS pain data not reported
Juul P 1999	No VAS pain assessment
Kalman SH 1995	No VAS pain assessment
Kerrigan DD 1993	No VAS pain assessment
Khazam A 1990	No VAS pain assessment
Kingsley D 1998	No VAS pain assessment
Kingsnorth AN 2000b	No VAS pain assessment
Knapp RW 1976	No VAS pain assessment
Korman JE 1997	No VAS pain assessment
Kovács JB 1997	No VAS pain assessment
Kumar S 1997	VAS pain data not reported
Kux M 1994	No VAS pain assessment
Lau H 2000	Not randomised
Lau H 2001	Not randomised
Lau H 2002a	Not randomised
Lau H 2002b	Not appropriately randomised

Lau H 2002d	Not randomised
Lau H 2003b	Not randomised
Leaverton GH 1972	No VAS pain assessment
Leibl BJ 2000	No VAS pain assessment
Liem MSL 2003	No VAS pain assessment
Makuria T 1979	VAS pain stats not reported
Markey JR 1997	No VAS pain assessment
Mathews S 2002	No analysis of herniorraphy subgroup
McEvoy A 1996	Not appropriately randomised
McGregor RR 1998	No VAS pain assessment
McLoughlin J 1989	VRS pain statistics not reported
Meier DE 2001	No VAS pain assessment
Millikan KW 1994	No VAS pain assessment
Mixter CG 1998	Laparoscopic herniorraphy
Morris J 1995	Not randomised; VAS pain statistics not reported
MRC LGHT Group 1990	No VAS pain assessment
Mulroy MF 1999	Study of sameridine, discontinued during clinical development
Musella M 2001	No VAS pain assessment
Naja MZ 2001	No VAS pain assessment
Naja Z 2002	Not randomised
Nilsson U 2003a	No analysis of herniorraphy subgroup
Nilsson U 2003b	No analysis of herniorraphy subgroup
O'Connor SA 1988	No VAS pain assessment
Ofili OP 1991	No VAS pain assessment
O'Riordain DS 1998	Laparoscopic herniorraphy
Paajanen H 2002	No VAS pain assessment
Pavlidis TE 2002	No VAS pain assessment
Pollock JE 1996	No analysis of herniorraphy subgroup for VAS pain data
Porrero C JL 1998	Not a comparative study
Prado E 1994	Not a comparative study
Rakower SR 1984	No VAS pain assessment
Ramella G 1993	No analysis of herniorraphy subgroup
Ramirez-Ruiz M 1995	No analysis of herniorraphy subgroup
Rowbotham DJ 1998	No analysis of herniorraphy subgroup

Rudkin GE 1995	No VAS pain assessment
Saff GN 1998	Laparoscopic herniorraphy
Sarli L 2001b	No subgroup analysis
Schultz LS 1990	Not a comparative study
Serpell JW 1990	No VAS pain assessment
Simpson JEP 1976	No VAS pain assessment
Simpson PJ 1982	No VAS pain assessment
Smith AI 1999	No VAS pain assessment
Suter M 2002a	Pain data also reported in Suter <i>et al.</i> Surg Endosc 2002;16(8):1214–1219
Suter M 2002b	Duplicate
Tverskoy M 1996	No VAS pain assessment
Twersky RS 1995	No analysis of herniorraphy subgroup
Van Hee R 1998	No VAS pain assessment
Vatansev C 2002	No VAS pain assessment
Vogt DM 1995	No VAS pain assessment
Vrijland WW 2002	No VAS pain assessment
Waechter FL 2001	Not randomised
Wassef MR 1998	VRS pain data not reported
Weinbroum AA 2001	No analysis of herniorraphy subgroup
Wilson MS 1995	Not randomised
Wood GJ 1981	No VAS pain assessment
Wright D 2002	No VAS pain assessment
Wulf H 1999	VAS data not reported
Yerdel M 2001	No VAS pain assessment
Young DV 1987	Not randomised