

# Impact of postoperative complications on the risk for chronic groin pain after open inguinal hernia repair

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**Background.** Chronic pain is common after inguinal hernia repair and has become one of the most important outcome measures for this procedure. The purpose of this study was to determine whether or not there is a relationship between specific postoperative complications and risk for chronic pain after open inguinal hernia repair.

**Methods.** A prospective cohort study was designed in which participants responded to the Inguinal Pain Questionnaire regarding postoperative groin pain 8 years after inguinal hernia repair. Responses to the questionnaire were matched with data from a previous study regarding reported postoperative complications after open inguinal hernia repair. Participants were recruited originally from the Swedish Hernia Register. Response rate was 82.4% (952/1,155). The primary outcome was chronic pain in the operated groin at follow-up. Grading of pain was performed using the Inguinal Pain Questionnaire.

**Results.** A total of 170 patients (17.9%) reported groin pain and 29 patients (3.0%) reported severe groin pain. The risk for developing chronic groin pain was greater in patients with severe pain in the preoperative or immediate postoperative period (odds ratio 2.09; 95% confidence interval 1.28–3.41). Risk for chronic pain decreased for every 1-year increase in age at the time of operation (odds ratio 0.99, 95% confidence interval 0.98–1.00).

**Conclusion.** Both preoperative pain and pain in the immediate postoperative period are strong risk factors for chronic groin pain. Risk factor patterns should be considered before operative repair of presumed symptomatic inguinal hernias. The problem of postoperative pain must be addressed regarding both pre-emptive and postoperative analgesia. (Surgery 2016;■:■-■.)

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HERNIA REPAIR is one of the most common operative procedures.<sup>1</sup> The lifetime risk for an inguinal hernia operation in Western countries is estimated to

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be 27% in men and 3% in women.<sup>2</sup> As a consequence of the decrease in risk for recurrence after modern mesh repair, chronic pain has become one of the most important outcome measures after an inguinal hernia operation. Reoperation due to recurrence within 2 years after operation has a frequency of <2%.<sup>3,4</sup> Chronic pain is defined generally as pain lasting >3 months, but the studies on postoperative chronic pain often address the presence of pain several years after inguinal herniorrhaphy.<sup>5-7</sup> The prevalence of groin pain after inguinal hernia repair has been reported to be 20–30%.<sup>8,9</sup>

In a cohort from the Swedish Hernia Register (SHR), 30% of the patients reported pain in the operated groin 2 to 3 years after inguinal hernia repair, and 6% had severe pain that limited their ability to perform daily activities.<sup>10</sup> In a

cross-sectional cohort study on patients from the same register, the proportion of patients with postoperative groin pain continued to decrease 7 years after operation. Nevertheless, pain persists in 14% of patients 7 years after operation.<sup>11</sup>

When addressing risk for chronic pain, patient- and operation-related risk factors may be identified. Several patient-related risk factors are already known. The risk for developing chronic postoperative pain is increased in younger patients, women, and patients with preoperative pain either in the area of planned operation or in another part of the body.<sup>10,12</sup> Some genotypes have also been shown to be associated with an increased risk for chronic postoperative pain.<sup>13,14</sup>

Operative technique, handling of nerves, choice of mesh, and choice of mesh fixation are among the operation-related risk factors that have been explored in previous studies. Open operative techniques have been associated with an increased risk for chronic pain.<sup>8,10,15</sup> Regional anesthesia has also been suggested to be associated with an increased risk for pain compared to other forms of anesthesia. Severe, short-term pain after inguinal hernia repair has been shown to increase the risk for pain one year after the procedure.<sup>12</sup> Furthermore, an association between postoperative complication and pain some years after operation has been suggested.<sup>10,16</sup>

There are, thus, reasons to believe that chronic postoperative pain in many cases is triggered during the immediate postoperative period. Patient-perceived, long-term outcome after postoperative surgical complications after inguinal hernia repair, however, has been evaluated poorly. Such an investigation is lengthy and requires reliable and defined data gathered during the immediate postoperative period and at the end of follow-up.

The aim of this longitudinal cohort study was to explore the long-term effects of postoperative surgical complications with the hypothesis that the occurrence of a complication increases the risk for chronic pain.

## MATERIAL AND METHODS

The present study is based on a cohort defined in a previous study on patient-reported operative complications.<sup>17</sup> This cohort was assembled by requesting all patients who had undergone inguinal hernia operation during November and December 2002 and were registered in the SHR to respond to a questionnaire regarding operative complications during the first postoperative month. The SHR is a national, adult, groin hernia surgery register

including 95 clinics with 98% coverage of all Swedish inguinal hernia operations in adults.<sup>18,19</sup> Of the 1,643 patients operated in this 2-month period, 1,448 (88.1%) completed the questionnaire. Postoperative complications within the first month after operation were reported by 391 (23.8%) patients.

Responders who had had an open repair with mesh or suture technique were considered eligible for this study. The complication pattern differs between open and laparoscopic hernia repairs, and 98% of the repairs during the inclusion period were performed with the open technique. The small proportion of patients undergoing laparoscopic repair was considered irrelevant in this context and was excluded from this analysis. After exclusion of deceased patients and those who had emigrated, 1,155 patients remained eligible (Fig) and were contacted 8 years after the index operation. They were asked to complete the Inguinal Pain Questionnaire (IPQ), a validated tool assessing the functional impact of groin pain after inguinal hernia operation.<sup>20</sup> One reminder was sent to nonresponders.

The questionnaire assesses the intensity of pain on a 7-grade ordinal scale (0—no pain, 1—pain can be ignored, 2—pain cannot be ignored but does not affect everyday activities, 3—pain cannot be ignored and affects everyday activities, 4—pain prevents most activities, 5—pain necessitates bed rest, 6—pain requires immediate medical attention). The IPQ also comprises questions (yes/no) regarding difficulties in performing 6, specified, everyday activities due to pain in the operated groin and, for men, presence of testicular pain on the operated side. Data from the IPQ were matched individually against responses to the complication questionnaire from the initial study.

Ethical approval for the study was granted by the Regional Ethics Review Board in Stockholm (no. 2010/583-31/2).

**Statistical analysis.** Statistical analyses were performed using Stata software (SE 12.1; StataCorp LP, College Station, TX). Separate logistic regression models were used for the outcomes “pain in the operated groin” and “testicular pain on the side of hernia surgery.” The IPQ item on “pain intensity past week” was divided into “no pain” versus all other levels of pain intensity.

The outcomes were analyzed against the following possible risk factors: sex; age at time of operation; preoperative pain (retrospectively reported in the IPQ on a 7-grade ordinal scale); mode of anesthesia (local/regional/general); method of repair (anterior mesh/posterior mesh/plug repair/suture repair); suture material for fixation (nonabsorbable suture/slowly absorbable suture/rapidly absorbable

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