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Chronic pain following total hip arthroplasty: a nationwide questionnaire study

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Background: Chronic post-operative pain is a well-recognized problem after various types of surgery, but little is known about chronic pain after orthopedic surgery. Severe pre-operative pain is the primary indication for total hip arthroplasty (THA). Therefore, we examined the prevalence of chronic pain after THA in relation to pre-operative pain and early post-operative pain.
Methods: A questionnaire was sent to 1231 consecutive patients who had undergone THA 12–18 months previously, and whose operations had been reported to the Danish Hip Arthroplasty Registry.
Results: The response rate was 93.6%. Two hundred and ninety-four patients (28.1%) had chronic ipsilateral hip pain at the time of completion of the questionnaire, and pain limited daily activities to a moderate, severe or very severe degree in 12.1%. The chronic pain state was related to the recalled intensity of early post-operative pain [95% confidence interval (CI), 20.4–33.4%] and pain complaints from other sites of the body (95% CI, 20.7–32.1%), but not to the pre-operative intensity of pain.
Conclusion: Chronic pain after THA seems to be a significant problem in at least 12.1% of patients. Our results suggest that genetic and psychosocial factors are important for the development of chronic post-THA pain.

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Key words: chronic pain; post-operative pain; risk factors; total hip arthroplasty (THA).

THE incidence of post-surgical pain is high after several operations, such as amputation, mastectomy, thoracotomy, sternotomy, gallbladder surgery and inguinal hernia repair (1, 2). Up to 60–80% of amputees experience phantom pain after amputation (3), and breast surgery is followed by chronic pain in 20–50% of patients (4). A similar high percentage of patients develop chronic pain after thoracotomy (5), sternotomy (6) and femoro-popliteal bypass surgery (7). Common operations, such as gallbladder surgery, inguinal hernia repair and Cesarean section, may also lead to chronic pain in approximately 12–30% of patients (8–10).

The etiology behind the development of chronic pain after surgery is not fully known, but several risk factors have been identified (1). Pre-operative pain (11, 12) and acute post-operative pain (10, 13, 14) have been shown to increase the risk of chronic post-surgical pain. Intra-operative events, such as intra-operative nerve damage, may play a role in the development of chronic pain (15, 16), as well as genetic and various psychosocial factors (1). However, the relative importance of each of the above-mentioned risk factors for the development of chronic pain is not clear, and only a few data from well-controlled prospective studies exist.

To gain more knowledge about post-surgical pain, we decided to study pain after total hip arthroplasty (THA) in a large-scale, register-based study for the following reasons.

1 Little is known about chronic pain after orthopedic surgery.
2 THA is a common surgical procedure.
3 Severe pre-operative pain is the primary indication for THA.
4 Early post-operative pain may be moderate/severe (17).
5 The risk of intra-operative nerve damage is low (18).

Our aim was to identify various risk factors for the development of chronic pain, with specific attention being paid to the relationship between pre-operative pain, early post-operative pain and chronic hip pain.

Methods

Patients

Patients were recruited from the Danish Hip Arthroplasty Registry (http://dhr.dk). The registry was established in 1995, and 94% of all primary THAs in Denmark are reported (19). Inclusion criteria included an age between 18 and 90 years, THA because of degenerative hip arthritis, operation through a posterolateral surgical approach, pre-operative registration of pain [derived from the Harris Hip Score (HHS)] and operation performed in the period from 1 March to 31 October 2003. Patients with previous or subsequent ipsilateral or contralateral hip operations were not included.

Procedure

A questionnaire with a pre-stamped return envelope, and with a reminder in the case of no reply, was mailed to all patients in September/October 2004. Thus, the time interval from operation to the completion of the interview varied from 12 to 18 months. Patients were asked to recall the intensity of early post-operative pain. If hip pain was still present, patients were asked to describe the frequency and intensity of pain and its impact on daily activities. The short-form McGill Pain Questionnaire (MPQ) was used for the further description of pain. Patients also shaded an area of the location of their perceived pain on an anterior and posterior drawing. Finally, patients were asked about the consumption of analgesics, pain problems elsewhere, operations in the leg except for THA, scar sensibility, height and weight. The following data were derived from the registry: age, gender, pre-operative pain, anesthetic method and duration of operation.

The study was approved by the Danish Law of Data Protection and the oversight board of the Danish Hip Arthroplasty Registry. Because of the rules regulating the use of the registry, contact with patients was required to be based on the registration in the Danish National Administrative System. The information from the two registries was linked by the use of unique social security numbers.

Statistical analysis

Data from the returned questionnaires, together with data from the registry, were analyzed using STATA version 8.0 software. Data are presented as the mean and standard deviation (SD), with 95% confidence intervals (CIs) where appropriate; 95% CIs for differences are presented. Data concerning the characteristics of chronic hip pain are presented as a percentage of the total number of patients if nothing else is stated.

Results

Patient characteristics and chronic hip pain

One thousand, two hundred and thirty-one patients met the inclusion criteria and received a questionnaire; 1152 (93.6%) responded (Fig. 1).

Results from the questionnaires are shown in Tables 1 and 2. Hip pain was still present in 294 patients (28.1%; 95% CI, 25.3–30.7%) and, in 124 patients (11.8%), pain was present daily or constantly. Fifty-three patients (5.1%) had moderate or severe pain at rest; 115 patients (11%) had moderate or severe pain when walking. The mean intensity of pain was 3.7 (SD, $\pm$2.4; Numeric Rating Scale (NRS), 0–10)

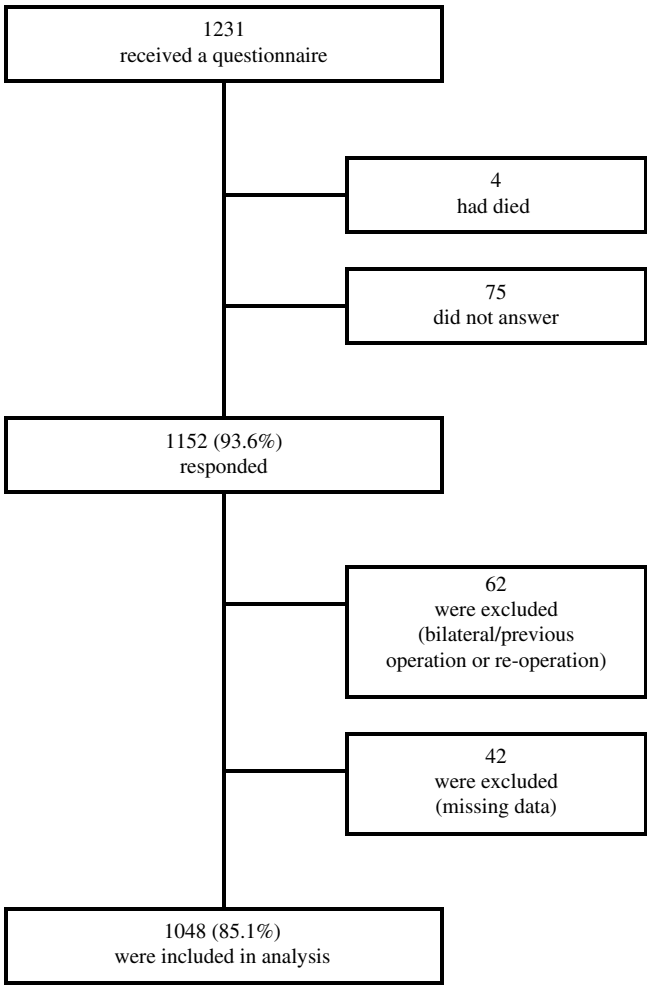

Fig. 1. Flow chart of the patients.

Table 1

Demographic data, pre-operative pain, recalled intensity of post-operative pain, anesthetic method and duration of surgery.

Number of patients	1048
Age (years) (mean, SD)	71.6 (8.7)
Body mass index (BMI) (mean, SD)	27.0 (4.9)
Previous operations in the same leg	207 (19.8%)
Frequency of pain elsewhere	
No pain	415 (39.6%)
Weeks interval	62 (5.9%)
Days interval	171 (16.3%)
Daily	278 (26.5%)
Constant	122 (11.6%)
Pre-operative hip pain (Harris Hip Score, HHS)	
No pain	1
Very mild pain	3
Mild pain	30 (2.9%)
Moderate pain	307 (29.3%)
Severe	553 (52.8%)
Disabling pain	152 (14.5%)
Recall of post-operative pain intensity	
No pain	281 (26.8%)
Mild pain	338 (32.3%)
Moderate pain	300 (28.6%)
Severe pain	92 (8.8%)
Do not remember	37 (3.5%)
Anesthetic method	
Regional	831 (79.3%)
General	201 (19.2%)
Combined	16 (1.5%)
Duration of surgery (min) (mean, SD)	79.1 (24)

(Fig. 2). Pain disturbed sleep in 90 patients (8.9%) and had moderate, severe or very severe impact on daily life in 127 patients (12.1%). The words used from the MPQ to describe pain were tiring, exhausting, shooting, tender, gnawing and cramping. Pain drawings documented that the pain was located to the lateral aspect of the hip, including the trochanteric region, in almost all cases (Fig. 3). Eighty-six of the 294 patients (29.3%) were taking analgesics daily because of pain in the operated hip [paracetamol, $n = 39$; non-steroidal anti-inflammatory drugs (NSAIDs), $n = 20$; tramadol, $n = 16$; slow-release morphine, $n = 9$; amitriptyline/gabapentin, $n = 2$].

Relationship between chronic hip pain and various factors

Chronic hip pain was related to the recalled intensity of moderate or severe acute post-operative pain (Difference (DIFF) = 58.2% − 31.3% = 26.9%; 95% CI, 20.4–33.4%) and to pain complaints from other sites of the body (DIFF = 80.6% − 54.2% = 26.4%; 95% CI, 20.7–32.1%), but not to the pre-operative intensity of pain as recorded by HHS.

Table 2

Characteristics of chronic pain after hip arthroplasty.

Number of patients	294 (28.1%)
Frequency of pain	
Weeks interval	78 (26.5%)
Days interval	92 (31.3%)
Daily	96 (32.7%)
Constant	28 (9.5%)
Intensity of pain	
At rest	
Not present	132 (44.9%)
Mild	109 (37.1%)
Moderate	44 (15.0%)
Severe	9 (3.1%)
When walking	
Not present	45 (15.3%)
Mild	134 (45.6%)
Moderate	83 (28.2%)
Severe	32 (10.9%)
Intensity of pain on Numeric Rating Scale (NRS), 0–10 (mean, SD)	3.7 (2.5)
Impact on daily activities: pain is a problem when	
Rising from a low chair	181 (44.9%)
Sitting down for more than 30 min	166 (56.5%)
Standing up for more than 30 min	160 (54.4%)
Walking on stairs	163 (55.4%)
Carrying heavy bags	201 (66.4%)
Driving	55 (18.7%)
Doing sports	54 (18.4%)
Working	73 (24.8%)
Disturbance of sleep	90 (30.6%)
Impact on mood	124 (42.2%)
Overall impact on daily life	
No	24 (8.2%)
Mild	143 (48.6%)
Moderate	81 (27.6%)
Severe	35 (11.9%)
Very severe	11 (3.7%)

There was no difference between patients with and without chronic hip pain with regard to the following: previous operation in the same leg (e.g. operation for varicose veins) (21.8% vs. 18.8%), regional anesthesia (80.6% vs. 80.9%) and body mass index (BMI) > 25 at the time of the interview (69.4% vs. 69.1%).

Gender differences

The prevalence (29.5% vs. 25.9%) and intensity (3.8 vs. 3.6; NRS, 0–10) of chronic hip pain were similar in women and men, but women were more likely to have daily or constant pain (DIFF = 47.3% − 33.6% = 13.7%; 95% CI, 2.3–25.1%). Women also more often had daily or constant pain problems elsewhere (DIFF = 44.8% − 28% = 16.8%; 95% CI, 11–22.3%). Severe or disabling pre-operative pain, as recorded by HHS, was not more frequent in women.

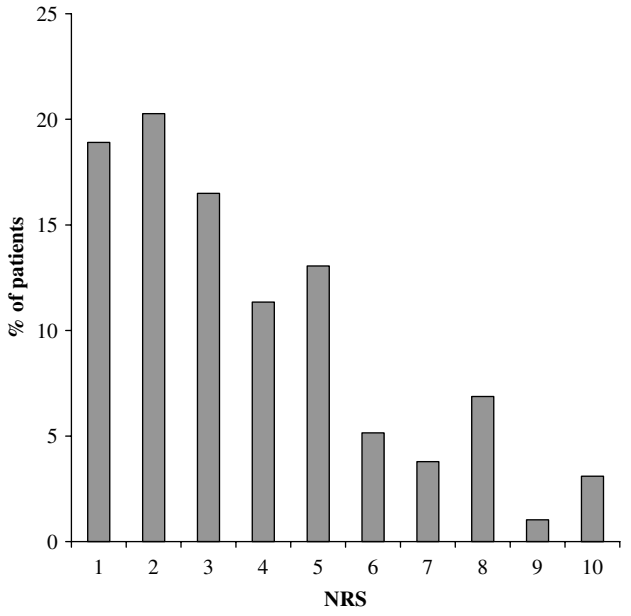

Fig. 2. Intensity of chronic hip pain (n = 294). Patients recorded average pain intensity in the last week (Numeric Rating Scale (NRS), 0–10).

Sensory dysfunction

Patients with chronic hip pain significantly more often reported dysesthesia and allodynia in the incisional area than did patients without pain (DIFF = 7.5% − 3.1% = 4.4%; 95% CI, 1.2–7.6%).

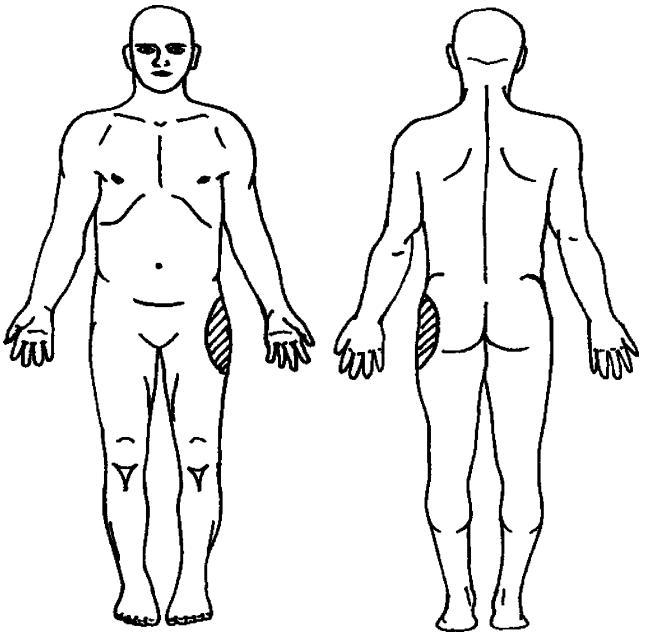

Fig. 3. Location of chronic hip pain.

Discussion

In this large-scale, register-based study, a high proportion (28.1%) of all patients had some degree of hip pain 12–18 months after THA.

Chronic pain after primary THA may be attributed to several pathogenetic mechanisms. A series of experimental studies have shown that noxious stimuli may produce hyperexcitability and sensitization in second-order neurons in the central nervous system [for a review, see Woolf and Salter (20)]. The clinical manifestations of cellular hyperexcitability after tissue injury are only partially known. However, it has been suggested that persistent pain, various types of evoked pain, after-sensations and extraterritorial spread to non-damaged tissue may be a consequence of cellular hyperexcitability whether produced by inflammation or nerve damage (21, 22). Therefore, an afferent barrage of noxious input before (e.g. input from a painful hip with degenerative arthritis), during and after surgery (post-operative pain) could be important for the development of chronic post-THA pain. We were unable to demonstrate a relationship between pre-operative pain, as recorded by HHS, and chronic hip pain, but this may be due to the fact that most of the patients were classified as having either severe or disabling pre-operative pain. The recalled intensity of acute post-operative pain was related to chronic hip pain. As the intensity of post-operative pain and the consumption of analgesics were not recorded at the time of surgery, we do not know whether these patients indeed suffered from more post-operative pain. A prospective study with a more detailed description of pre- and post-operative pain is necessary to clarify these issues.

Chronic pain after THA may theoretically be caused by intra-operative damage to the sciatic, femoral and obturator nerves (18). Indeed, more patients with chronic hip pain reported dysesthesia/allodynia. From the present (patient-reported) sensory abnormalities, we cannot determine whether the reported dysesthesia/allodynia was a result of damage to one of the nerves or of non-specific hypersensitivity referred from deep structures. Mikkelsen et al. (23) examined pain and sensory dysfunction in 72 patients, 6–12 months after inguinal hernia repair. Sensory dysfunction was common (51%), but was equally frequent in patients with and without pain, suggesting that the specificity for chronic post-surgical pain is rather low.

Patients with chronic hip pain were more likely to suffer from pain problems elsewhere, as also

demonstrated in hernia surgery (10). Again, this feature is non-specific, but raises the question of whether genetic and psychosocial factors are important for the development of chronic pain after surgery.

Women reported more pain than men, confirming other studies on gender and pain, and this is probably related to a number of biological and psychosocial factors (24, 25).

The present study has certain shortcomings. First, it is a retrospective study with all the innate limitations of such a design. This may be important for the recall of post-operative pain. Previous studies in other post-operative conditions have shown that the intensity of pain is overestimated (12, 26). Second, the follow-up period in the present study was relatively short, and it can be argued that pain will eventually resolve in some of the patients. However, a prospective study including 94 patients found that the prevalence of chronic pain after THA was unchanged after 5 years (27). Third, patients did not undergo a clinical evaluation, including radiographic assessment, at the time of completion of the questionnaire. This would have allowed a more detailed and accurate description of pain and sensory dysfunction, and, in particular, would have clarified the issue of hypersensitivity phenomena as manifestations of pain. Finally, hip pain may also be present in the normal population; a control group was not included in the present study. Recent epidemiological studies have shown that approximately 19% of the adult population suffers from various non-malignant pain states, and this figure increases with increasing age (28). Brinker et al. (29) examined 200 older individuals with no history of hip pathology or treatment or operation for hip-related conditions. Only 65% were completely asymptomatic, but the level of pain and functional impairment was much lower than that in patients in the present study. On the other hand, the strength of our study is its large size, the high response rate and the fact that it represents unselected nationwide data.

In conclusion, we found that a high proportion of patients continue to have hip pain after THA. Genetic and psychosocial factors may be important for the development of chronic post-THA pain, but the fact that hyperexcitability in the skin was more common in patients with chronic pain suggests that hyperexcitability in the nervous system could be related to pain. Future prospective studies should include a detailed assessment of pre-operative, intra-operative and post-operative factors in order to clarify the relative pathogenetic role of these factors.

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