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# Chronic postsurgical pain in children: prevalence and risk factors. A prospective observational study

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## Abstract

**Background:** Chronic postsurgical pain (CPSP) is well known in adults, with prevalence rates ranging from 10 to 50%. Little is known about the epidemiology of CPSP in children. The aim of this prospective observational study was to evaluate the prevalence of CPSP after surgery in children.

**Methods:** After informed consent, children aged six to18 yr were included. Characteristics and risk factors for CPSP were recorded. Exclusion criteria included ambulatory surgery, refusal, inability to understand and change of address. All eligible children completed a preoperative questionnaire the day before surgery about pain, anxiety and their medical history. All data concerning anaesthetic and surgical procedures, such as acute pain scores (VAS) during the first 24 h were recorded. Three months after surgery all included children were sent a postoperative questionnaire about pain at the surgical site.

**Results:** Altogether, 291 children were enrolled; the mean age was 12 yr, most subjects were male (60%). The most common type of surgery was orthopaedic (63%). In the 258 patients who completed the study, the prevalence of CPSP was 10.9%, most often with a neuropathic origin (64.3%). The two main risk factors were the existence of recent pain before surgery (<1 month) and the severity of acute postoperative pain (VAS >30 mm) in the first 24 h after orthopaedic and thoracic surgeries. Six months after surgery, only five children needed a visit with a chronic pain practitioner.

**Conclusions:** These results highlight the necessity of evaluating and treating perioperative pain in order to prevent CPSP in children.

**Key words:** children; chronic pain; postoperative pain

Chronic postsurgical pain (CPSP), defined as pain persisting 3 months after surgery,[1] is well known in adults.[1–3] Its incidence depends on the type of surgery, with rates of up to 60% after amputations, 30 to 50% after thoracotomies or breast surgeries,[4] and approximately 10% after inguinal hernia repairs. Among patients experiencing CPSP, neuropathic syndromes[5] are more frequent.[4 6 7]

The causes of CPSP in adults are not fully known, but several risks factors have been established. The main predictive risks factors are preoperative pain, many surgeries, psychological factors, surgical risks of nerve damage,[8 9] and the severity of acute postoperative pain.[10]

In children, chronic medical pain is frequent,[11] occurring most commonly in children with chronic diseases. The prevalence of

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**Editor's key points**

- Little is known about the epidemiology of chronic post-surgical pain (CPSP) in children.
- The authors performed a prospective study of the prevalence and risk factors for CPSP in children.
- The prevalence of CPSP was found to be 10.9%.
- Risk factors for CPSP were pain before surgery and severe acute postoperative pain.

pain such as headaches, abdominal pain[12] and back pain[13] varies from 25 to 46%.[14 15] The prevalence of severe chronic pain and multi-site pain is especially high in girls.[16]

While the severity of acute postoperative pain in children has been extensively studied, only few, mostly retrospective studies focused on CPSP in this population.[17]

The aim of this epidemiologic prospective study was to determine the prevalence of CPSP, defined as persisting pain 3 months after surgery and rated ≥30 on a 100-point visual analogue scale (VAS), in children aged six to 18 yr. We also intended to determine the intensity of CPSP, the prevalence of neuropathic syndrome and the risk factors for CPSP.

## Methods

### Patients

Following approval from the hospital Ethics Committee of CHU de Bordeaux, France (Comité de Protection des Personnes Sud-Ouest et Outre-Mer III, Chairperson Pr JP Duprat) and informed consent of the children and their parents, all children aged six to 18 yr undergoing elective surgery in our institution between March 2010 and April 2011 were included in this prospective observational study. The study was reviewed and approved by the French committee for personal data protection (CNIL ref. 1415799). A coordinating clinical research assistant (CRA) was designated to assist the main investigator with subject recruitment and follow-up.

Children undergoing day case surgery, who were unwilling to participate, who had an insufficient understanding of the questionnaires or who moved away from their current address during the study period, were not included.

### Procedure

Information on the study was first given at the preanaesthetic visit in the month before surgery. Parents and children read an information sheet at home and gave us their verbal consent. The day before the intervention, eligible children with the help of their parents, completed the preoperative questionnaire.

### Measure

In the preoperative questionnaire, patient characteristics information including age, sex, weight, height, medical or surgical history, and history of chemotherapy or radiotherapy were collected. For pre-existent pain (>1 month) and recent pain (<1 month), the following parameters were gathered: history, location (site of later surgery or elsewhere), frequency and intensity of the pain (the pain score on the VAS was transformed into a 3-modality outcome: VAS <30 = mild pain, 30–59 = moderate pain, ≥60 = severe pain) and neuropathic component (self-report DN4 scale ≥4). The DN4 is a validated tool to screen for a neuropathic origin of chronic pain in adults.[5] The DN4 has been used in paediatric patients aged more than six yr with burn sequelae because patients and their parents easily understand it.[18] It includes three items about the type of pain (burning/painful and cold/electric shock), four items about the associated symptoms (tingling/pins and needles/numbness/itching), two about the existence of numbness in the painful area (on contact/on pinching), and one on the initiation or enhancement of pain by rubbing. It was initially designed to be completed with the help of a physician, but for the purposes of this study, the questions were adapted for completion by the patient.[19]

Four questions were asked regarding the impact of the pre-existing pain on current functioning, including attending school, eating, sleeping and playing. The impact of the pain was defined as severe if it impaired either eating or sleeping and was defined as moderate if it impaired educational or recreational activities without interfering with sleeping or eating. We considered there to be no impact on daily activities if the answers to all four questions were 'no.'

Parents and children reported if they had taken any medication. Finally, they had to fill in a Visual Analogue Scale of anxiety (VAS anxiety 0–100 mm).[20] The anxiety score on the VAS was transformed into a three-modality outcome: VAS <30 = mild anxiety, 30–59 = moderate anxiety and ≥60 = severe anxiety. The 'preoperative' questionnaire was kept in the study file.

On the day of the surgery, we collected data about the anaesthetic (general anaesthesia±regional anaesthesia) and surgical procedures (type of surgery, duration, and scar size). An evaluation of the child's pain was conducted in the first 24 h after the surgery using a VAS score (0–100 mm). The pain score on the VAS was transformed into a three-modality ordinal outcome (<30 = mild pain; 30–59 = moderate pain; ≥60 = severe pain). Children were asked about their worst pain at rest in times slots (H0; H1; H2; H4; H8; H12). Evaluations of pain began just after extubation (H0).

Ten to twelve weeks after surgery, a questionnaire with a prestamped return envelope was sent to all eligible children included in the study. Response was required for three months after surgery. If they failed to reply by the four months mark, we called them to complete the questionnaire by phone. In the postoperative questionnaire, they were asked about the status of their pain in the operated area three months after the surgery using a VAS score (0–100 mm). In patients with CPSP (VAS ≥30 mm), they also completed the DN4 questionnaire to determine if there was a neuropathic component. They were also asked four questions regarding the impact of CPSP on daily activities such as going to school, playing, eating or sleeping, as in the preoperative questionnaire. They were asked if they had received any medications or analgesic treatments, and if they had pain in another location, and if so, what the intensity was (using a VAS score). Those experiencing pain were asked if they had been given any treatment for it, and if so, what type. Finally, we asked if children could participate in athletic activities and if they had experienced anxiety since the surgery (VAS anxiety 0–100 mm).

When we received questionnaires by mail, a pain doctor contacted all children who reported a VAS score ≥30 mm in any location to suggest they visit a practitioner for analgesic treatment. This telephone contact was done at least five months after surgery.

### Statistical analysis

#### Sample size estimation

According to the literature, the expected prevalence of persisting pain (CPSP) at three months after surgery in adults is 20%.[3] To