



## Original Article

## Chronic post-thyroidectomy pain: Incidence, typology, and risk factors



Jean-Michel Wattier<sup>a,d</sup>, Robert Caïazzo<sup>b,d</sup>, Grégoire Andrieu<sup>a,d</sup>, Eric Kipnis<sup>a,d</sup>, François Pattou<sup>b,d</sup>, Gilles Lebuffe<sup>c,d,\*</sup>

<sup>a</sup> Pôle d'anesthésie réanimation, CHU de Lille, 59000 Lille, France

<sup>b</sup> Service de chirurgie générale et endocrinienne, CHU de Lille, 59000 Lille, France

<sup>c</sup> Pôle d'anesthésie réanimation, University of Lille, CHU de Lille, EA7365-GRITA – Groupe de recherche sur les formes injectables et technologies associées, 59000 Lille, France

<sup>d</sup> Rue Michel-Polonovski, 59037 Lille cedex, France

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## ABSTRACT

Chronic postoperative pain exists in varying degrees for every type of surgery. An evaluation of the incidence, the typology and predictive factors of chronic pain was carried out at 3 and 6 months after thyroidectomy. A prospective observational study, having included each of the patients prior to their thyroidectomy, was carried out over 12 months. The patients used an 11-point numerical rating scale (NRS), a neuropathic pain screening questionnaire (DN4), an evaluation scale for anxiety and for the need for information related to anaesthesia and surgery (APAIS), a questionnaire describing pain (QDSA) and a questionnaire evaluating neuropathic pain (NPSI) before surgery and at three and six months later. Three hundred and four patients were included. The questionnaires were completed by 251 patients (57 males and 194 females) at 3 and 6 months (82%). At 3 months, 31 out of 251 (12%) patients mentioned a DN4  $\geq 3$ ; at 6 months, this rate dropped to 23 out of 251 (9%). The average intensity of chronic postoperative pain remained low to moderate. Levels of anxiety and the need for information were higher in patients with postoperative pain at 3 and 6 months. In contrast, the number of intraoperative procedures using a bilateral superficial cervical plexus block (BSCPb) was lower in patients with DN4  $\geq 3$ . Multivariate analysis demonstrated that the type of anaesthesia procedure interfered with the risk of delayed pain after thyroidectomy. The presence of a DN4  $\geq 3$  was nearly three-fold greater in patients without BSCPb (OR 2.647, CI = 1.198–5.848).

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## 1. Introduction

Among patients with chronic pain, surgery is one of the main causes. Usually defined as a pain persisting more than 3 months after the surgical procedure, the incidence of chronic post-surgical pain varies widely from one intervention to another. Hence, in 30 to 70% of cases, limb amputation is followed by phantom pain or by pain in the stump, which may persist for several years [1]. Thoracotomy is known to frequently cause pain, often

evidently through injury to the intercostal nerve induced by the incision [2]. The extent of tissue deterioration inherent to total mastectomy leads to persisting pain in 30 to 50% of patients [3]. Overall, chronic post-surgical pain affects 10 to 60% of surgical patients [4]. Although the delayed postoperative pain is acknowledged in major, extensive or specific procedures, this entity remains to be recognized for more minor or less traumatic surgical procedures. Indeed, considering the over fifty thousand thyroidectomies performed annually in France, although the existence of chronic post-surgical pain was suspected, it had not been assessed until one of our previous studies in 2008 [5].

This persisting postoperative pain occurs in the absence of any surgical complication or any change in the underlying diseases or conditions in which the continuation of pre-existing pain might be the root of the ongoing algesic symptomatology [6]. Severe postoperative pain results in tissue and nerve damage, while the development of chronic pain involves a transitional process [7]. The pathophysiological mechanisms are complex and remain

\* Corresponding author. Pôle d'anesthésie réanimation, University of Lille, CHU de Lille, EA7365-GRITA – Groupe de recherche sur les formes injectables et technologies associées, 59000 Lille, France. Tel.: +33 3 20 44 61 44; fax: +33 3 20 44 44 00.

E-mail addresses: [jean-michel.wattier@chru-lille.fr](mailto:jean-michel.wattier@chru-lille.fr) (J.-M. Wattier), [robert.caiazzo@chru-lille.fr](mailto:robert.caiazzo@chru-lille.fr) (R. Caïazzo), [gregoire.andrieu@chru-lille.fr](mailto:gregoire.andrieu@chru-lille.fr) (G. Andrieu), [eric.kipnis@chru-lille.fr](mailto:eric.kipnis@chru-lille.fr) (E. Kipnis), [francois.pattou@chru-lille.fr](mailto:francois.pattou@chru-lille.fr) (F. Pattou), [gilles.lebuffe@chru-lille.fr](mailto:gilles.lebuffe@chru-lille.fr) (G. Lebuffe).

unclear. Both tissue and nerve damage, the inflammatory response and the release of nociceptor-activating neuromediators induce peripheral and central sensitisation that, however, vary in their expression in post-surgical subjects [4,8]. Given this varying clinical expression, assessing the characteristics of pain symptomatology might enable a better understanding of chronic post-surgical pain [9]. As concerns the latter, 10 to 50% of surgical patients report chronic pain. Therefore, identifying risk factors is a major challenge that should further lead to an individual approach to perioperative anaesthetic and analgesic treatments [10]. Both patient-related factors (demographic, medical and social) and procedure-related (anaesthetic or surgery-related) factors have been reported as predictive of chronic pain [11].

The objectives of this prospective study were:

- to evaluate the incidence of delayed pain at 3 and 6 months after thyroidectomy;
- to determine its symptomatology;
- to identify predictive factors.

## 2. Materials and methods

We conducted a prospective, observational study in the Department of Endocrine Surgery at the Lille University Teaching Hospital (Centre Hospitalier Régional Universitaire de Lille, France) between April 2010 and March 2011. The approval of the regional Ethics Committee (Comité de Protection des Personnes, Lille Ouest) and of the French National Informatics and Liberties Commission (Commission Nationale de l'Informatique et des Libertés – CNIL France) were obtained. Patients scheduled for thyroidectomy were sequentially included following informed consent obtained during the pre-anaesthetic visit the day before surgery.

### 2.1. Patients

The patients included were over 18 years of age and were scheduled to undergo partial or total thyroidectomy, with or without lymph node resection, for neoplastic disease, multinodular goitre (GMN), benign tumours or thyrotoxicosis. Only patients having recovered euthyroid status through appropriate medical treatment underwent surgery. Detailed information concerning the epidemiological nature of the study was provided and each patient was informed about the additional information that would be sought three and six months following surgery.

### 2.2. Anaesthetic management

The anaesthetic protocol was general anaesthesia maintained using halogenated anaesthetics without nitrous oxide. Intraoperative analgesia was sustained by injections of sufentanil titrated to variations in blood pressure and heart rate. Regional anaesthesia in the form of a bilateral superficial cervical plexus block (BSCP) in combination with the general anaesthetic was provided at the discretion of the anaesthesiologist without randomization. For the BSCP, 0.5% ropivacaine in combination with 5 µg/mL of clonidine was used in accordance with the technique described by Andrieu et al. [12]. In the post-surgical ward, paracetamol was administered when pain was graded  $\geq 4/10$  on the numerical rating scale (NRS); tramadol was added when analgesia was inadequate (NRS  $\geq 4$ ). No patient was given opioids following thyroid surgery.

### 2.3. Surgical procedure

The same surgical team performed all surgical procedures. The surgical technique was distinguished by a small, low, arched

cervicotomy and the separation of the muscles of the thyroid compartment. A systematic search for the recurrent nerve and its pathway to the larynx was always performed in order to avoid injury. There were no modifications to the surgical technique during the recruitment period for the study.

### 2.4. Collected data

#### 2.4.1. Preoperative data

On the day prior to the surgery, eligible patients were asked about pre-existing pain in the anterior cervical region radiating from the thyroid compartment and they completed different questionnaires evaluating symptoms of pain:

- a pain intensity Numerical Rating Scale with 11 levels (NRS);
- the Saint-Antoine Pain Questionnaire (QDSA), a validated French version of the McGill Hospital pain questionnaire which analyses the sensory and affective dimensions of pain using two distinct scores [13];
- the self-administered version of the neuropathic pain questionnaire “interview” (DN4), which allows neuropathic pain to be suspected when the score is  $\geq 3/7$  [14];
- the evaluation questionnaire for neuropathic pain (NPSI) [11].

An evaluation of preoperative anxiety and of the need for preoperative information was carried out using a self-assessment scale (APAIS). This scale, initially developed by Moerman et al. [15], was translated into French and previously validated: a comparison with Spielberger's anxiety survey allowed us to ascertain that an APAIS over 10/20 corresponded to an increased level of anxiety [16].

#### 2.4.2. Intraoperative data

Underlying thyroid disease, surgical data (resected thyroid tissue weight, procedure, number of surgical drains) and anaesthesia data (adjuvant BSCP, total amount of sufentanil) were collected.

#### 2.4.3. Three and six month postoperative data

Three and six months following the surgery, patients included in the study were contacted by mail to evaluate symptoms of persisting pain. When no response was obtained by mail, patients were contacted by phone. Pain symptoms at these time points were again assessed using the abovementioned questionnaires (DN4 “interview”, NRS, QDSA, NPSI). Existence of persisting neuropathic pain was defined by a DN4 “interview” score  $\geq 3/7$ . As specified in the document accompanying the questionnaires, the topography of pain had to affect the cervical area, in the vicinity of scar tissue. To assess the incidence of postoperative pain characterized as neuropathic, two groups were then established, according to whether the score on the DN4 questionnaire was greater or equal to 3 or not.

#### 2.4.4. Statistical analysis

Continuous variables were expressed as means with standard deviations. Qualitative variables were expressed as frequencies and percentiles. The groups were compared using the Chi<sup>2</sup> test and the Fisher's Exact test, for qualitative variables, and the Wilcoxon test for quantitative variables. Paired data were compared using the McNemar's test. A value of  $P < 0.05$  was considered to be significant. A step-by-step logistic regression and a multivariate analysis were performed to identify predictive factors for chronic post-surgical pain at 3 and 6 months. All statistical analyses were performed using SAS System v9.1 (SAS Institute, Cary, North Carolina, USA).

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