Long-term success rates after an anterior neurectomy in patients with an abdominal cutaneous nerve entrapment syndrome

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Background. *Surgery occasionally is proposed in patients with chronic abdominal wall pain caused by an anterior cutaneous nerve entrapment syndrome (ACNES) who are refractory to injection therapy. An anterior neurectomy may seem successful, but follow-up is usually short and populations are small. The primary aim of this study was to determine the long-term success rate of surgery in a large ACNES population.*
Methods. *In this retrospective observational study, patients with ACNES ≥18 years who underwent a primary anterior neurectomy between January 2004 and February 2012 in one single center were studied. Pain scores were obtained before surgery, after surgery, and at the moment of questioning using a pain intensity numeric rating scale (PI-NRS 0–10) and a 6-point verbal category rating scale. Success was defined as a ≥50% PI-NRS reduction or ≥2 point verbal rating scale reduction.*
Results. *Data of 181 neurectomies in 154 individuals were available for analysis (female,* n = *127, 82.5%; age 47 ± 17 years, range, 20–83). Pain before operation was severe (mean PI-NRS 8.08, SD 1.43). Short-term (1–3 months postoperative) success was 70% (127/181 procedures). Three subjects showed spontaneous remission of complaints after ≥3 months. After a mean 32 months (range, 3–93) follow-up, a success rate of 61% (109/180) on the long-term was found.*
Conclusion. *A 70% short-term success rate and a 61% long-term success rate after a primary anterior neurectomy in patients with chronic abdominal pain due to ACNES were attained. Surgery is the method of choice in ACNES patients who are refractory to a conservative regimen. (Surgery 2015;157:137-43.)*

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Knowledge on the anterior cutaneous nerve entrapment syndrome (ACNES) as a neglected cause of chronic abdominal pain is limited.[1-13] Patients with ACNES experience severe neuropathic pain in the abdominal area that is caused by entrapped end twigs of intercostal nerves at the level of the anterior rectus sheath. Although abdominal pain is reported, they in fact suffer from pain originating in the abdominal wall. Patients harboring a triad of chronic abdominal pain, a circumscript pain point within the lateral boundaries of the rectus abdominis muscle (in the presence of a positive Carnett's test and/or local sensory disturbances), and the absence of abnormalities in blood analysis or ultrasonography/computed tomography are likely to suffer from ACNES until proven otherwise.

Two recent trials have shed light on diagnostic and therapeutic specifics regarding this syndrome. Pain reduction after trigger point infiltration using an anesthetic agent in patients with suspected ACNES was based on an anesthetic mechanism but not on a placebo, dry needling, or a mechanical (volume) effect.[9] In a subsequent double-blind, randomized trial with a sham operative arm, neurectomy of the intercostal nerve endings at the level of the anterior sheath of the abdominal

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rectus muscle ("anterior neurectomy") was effective for pain reduction in most patients who did not respond to a conservative regimen.[10]

Once recognized, patients with ACNES with unacceptable pain levels are advised to undergo a treatment regimen starting with one (or more) local trigger point injections. This approach is long-term effective in one-third of the population. Procedures such as an anterior neurectomy may be discussed with refractory patients. This step-by-step treatment protocol leads to total or substantial pain relief in 80% of the ACNES population.[8] Operative success rates were encouraging on the short and median term. For instance, a 73% success rate was demonstrated 6 weeks postoperatively in 22 patients in a randomized controlled trial.[10] After 18 months of follow-up, a neurectomy was effective in 71% of 69 other individuals.[8] However, these populations were relatively small, whereas the long-term efficacy of an anterior neurectomy is still a matter of uncertainty.

The formation of neuroma with consequent recurrence of symptoms is a feared long-term sequela of any operative procedure entailing a planned or accidental neurectomy.[14-17] The incidence of neuroma formation in patients with neurectomized ACNES is unknown. Furthermore, a portion of initially "cured" patients with ACNES may experience recurrence of pain once the effects of the local anesthetic (that is administered as standard procedure following the neurectomy) wears off. Aim of the present study is to determine the long-term success rate of an anterior neurectomy in a large ACNES population. It is hypothesized that the majority of initially successfully neurectomized patient remain free of abdominal pain on the long term.

MATERIALS AND METHODS

General information. This retrospective observational study was performed between January 2011 and January 2013 and analyzed neurectomies performed between 2004 and 2012 in Máxima Medical Center (MMC), a 595-bed community hospital situated in the southern part of The Netherlands. A separate surgical outpatient department of MMC (SolviMáx Center of Excellence for Abdominal Wall and Groin Pain) has a keen interest in chronic abdominal wall pain and groin pain syndromes (such as inguinal neuralgias and Pfannenstiel nerve entrapments) ever since the beginning of the new millennium. An increasing number of patients are evaluated by a team of experts.[4,8-13,18-23] In 2012, some 250 ACNES patients were treated in SolviMáx.

Data collection. Electronically stored data of all abdominal wall pain and groin pain patients receiving a neurectomy in MMC during an 8-year time period between January 2004 and February 2012 were retrospectively entered in a separate database. Patients with ACNES who were linked to registered operation codes were identified from this database. Only adult ACNES patients (≥18 year at time of treatment) registered as having undergone a primary anterior neurectomy were eligible for study (Fig 1). A primary anterior neurectomy was defined as the first attempt to remove portions of end twigs of one (or more) of the intercostal nerves surfacing at the level of the anterior rectus muscle sheath via an open surgical procedure.

Patients meeting inclusion criteria were studied using a standard approach. Individuals who underwent operation between 2004 and March 2011 were invited to respond to a questionnaire containing a set of questions that was sent by mail between March and May 2011. Nonresponders and patients operated between March 2011 and February 2012 were additionally interviewed by phone by the first author using the same set of questions between July 2012 and February 2013.

Operative details of an anterior neurectomy. Patients are operated in same day surgery as previously reported.[8,10] The area of interest supposedly containing the nerves responsible for the pain is marked preoperatively on the basis of a combination of a successful response on previous trigger point infiltration, currently reported pain determined via palpation, Carnett's test, and altered skin sensibility.[24-26] After induction of general anesthesia, the anterior sheath of the abdominal rectus muscle is exposed via a transverse 5- to 7-cm skin incision. The neurovascular bundle penetrating fascial foramina underneath the marked skin area is identified. The foramen is widened, and the neurovascular bundle is removed over a 1- to 3-cm length. The proximal portion of the bundle is allowed to retract deeply into the rectus muscle. Additional nerve branches penetrating the rectus sheath within a 5-cm radius also are removed. Accompanying small vessels are ligated or coagulated. Widened fascial foramina are closed using a running absorbable suture followed by a standard closing technique of the remainder of the incision. The operative area is infiltrated with 10 mL of 0.25% bupivacaine at the end of the procedure. An operative procedure usually lasts between 30 and 60 minutes. Postoperative wound pain management included the continuation of paracetamol, non-steroidal anti-inflammatory drugs, or opiate analgesic drugs as also administered in the preoperative phase, or if deemed necessary.