

# **Characteristics of 1116 consecutive patients diagnosed with Anterior Cutaneous Nerve Entrapment Syndrome (ACNES)**

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## ABSTRACT

**Objective:** Some patients with chronic abdominal pain may suffer from anterior cutaneous nerve entrapment syndrome (ACNES). ACNES is a clinical diagnosis as no additional imaging or function testing are available. The aim of this study is to discuss patient history and subjective findings at physical examination in a large case series to validate a proposed comprehensive set of major and minor diagnostic criteria.

**Methods:** This study retrospectively analysed prospectively obtained data from consecutive patients who received the diagnosis ACNES during evaluation at the SolviMáx Center of Excellence for Abdominal Wall and Groin Pain, Eindhoven, The Netherlands, between June 1st, 2011 and September 1st, 2016. Questionnaires, standard case forms and digital case files containing characteristics of individuals were used for analysis.

**Results:** Data of 1116 patients suspected and treated for ACNES consistently showed presence of the four following characteristics: sensory disturbances at the painful abdominal area (78%), a positive Pinch sign (78%), a positive Carnet's sign (87%), and a positive response to a modified rectus sheath block (>50% pain reduction, 81%). The majority of patients is female of young or middle age with a normal BMI reporting complaints that occurred spontaneously in either a sudden or gradual timeframe, developing a severe (NRS 6-8) chronic abdominal pain that was only diagnosed after a substantial doctor's delay.

**Conclusion:** A combination of typical findings in history and physical examination, combined with a positive modified rectus sheath block may allow for diagnosing ACNES in patients with chronic abdominal pain. The majority of these patients respond favourably to a neurectomy of the strained nerve.

## INTRODUCTION

Some patients with chronic abdominal pain suffer from an abdominal wall condition such as anterior cutaneous nerve entrapment syndrome (ACNES). Central in this entity is the presence of a chronic severe pain that is invariably present in a circumscribed area of the anterior abdomen.<sup>1</sup> The diagnosis is based on the combination of a rather nonspecific history but an often characteristic physical examination. As abdominal imaging is often normal, this illusive condition is met by skepticism. However, two recent randomized trials investigating the role of diagnostic injections and surgery have contributed to the acceptance of ACNES as a unique entity among a range of abdominal wall pain syndromes.<sup>2,3</sup>

In ACNES, pain may be elicited by a change in body position or a provoking exercise of the abdominal muscles. Additional clues are the presence of discrete somatosensory abdominal skin disturbances and increased pain when simultaneously tensing the rectus abdominis muscle and palpating the painful area (Carnett's sign). Moreover, a disproportionate sense of pain following squeezing of the skin portion covering the point of maximal pain is often reported (Positive pinch test).<sup>4,5</sup>

Abdominal pain due to ACNES is easily missed or erroneously judged as pain of visceral origin such as irritable bowel syndrome. One study in a Dutch primary care setting revealed that some 3-4% of chronic abdominal pain patients who were classified as having irritable bowel syndrome (IBS) were actually suffering from ACNES.<sup>6</sup> If one extrapolates this percentage for example to the situation in the United States of America, many thousands of ACNES patients will currently be misdiagnosed with IBS or functional abdominal complaints.

There are also other data indicating that ACNES is probably more common than previously thought. The ACNES incidence in patients evaluated for acute abdominal pain in an emergency department of a large teaching hospital was approximately 2%.<sup>7</sup> Moreover, ACNES may occur at any age, including children and octogenarians. Physicians of virtually all sorts may be confronted with this condition including gastro-enterologists, gynecologists, pediatricians, pain specialists, surgeons and general practitioners. Once ACNES is considered based on history and physical examination, pain relief following a subfascial rectus sheath block using a local anesthetic agent contributes to the diagnosis.<sup>3</sup>

The pathophysiology of ACNES is incompletely understood. Between the 1950s and 70s it was hypothesized that this neuropathic pain syndrome likely occurred due to entrapped end twigs of intercostal nerves.<sup>8</sup> These intercostal nerves find their origin at the seventh to 12<sup>th</sup> thoracic vertebrae and traverse along the costae to the abdominal wall and innervate the oblique muscles. Nerve endings were thought to be compressed while tunneling through posterior portions of the rectus abdominis muscle, possibly

provoked in situations of elevated intra-abdominal pressure occurring for instance during pregnancy or laparoscopic surgery. These end branches are almost purely sensory at the level of the rectus muscle and often less than one millimeter in diameter, precluding proper imaging. However, entrapment is likely just one pathophysiological mechanism, as some 60% of patients reported the absence of any event contributing to the onset of ACNES.<sup>9</sup>

Therapeutic options in ACNES are based around the paradigm of entrapment and intercostal nerve irritation. Local injection therapy, pulsed radio frequency treatment and surgical removal of a portion of the strained nerve using a neurectomy are the cornerstones of treatment.<sup>10</sup> However, modalities such as rehabilitation therapy and physical therapy comprising for example connective tissue massage are under debate as well as advanced neuromodulation techniques such as spinal cord stimulation.<sup>11</sup>

As a tertiary referral center, our hospital is exposed to a large number of patients with chronic abdominal wall and groin pain syndromes. Aim of the present large case series encompassing over one thousand ACNES patients who were diagnosed during a 5-year-period is to discuss characteristics and to propose a set of major and minor criteria associated with the diagnosis ACNES, with respect to global treatment results in this population. Moreover, mechanisms potentially evoking the syndrome as well as remarkable clues in history and physical examination are discussed.

## METHODS

### Study design

This study retrospectively analyzed prospectively obtained data from consecutive patients who were referred to the SolviMáx Center of Excellence for Abdominal Wall and Groin Pain, Eindhoven, The Netherlands, between June 1<sup>st</sup>, 2011 and September 1<sup>st</sup>, 2016. All were suspected of having ACNES and received treatment. The database search was conducted between August 1<sup>st</sup> – September 1<sup>st</sup> 2017. Home questionnaires, outpatient evaluation, standardized case forms and digital case files containing characteristics of individuals were entered in a comprehensive database that was used for analysis. Anonymized coding of data was performed and monitored by two independent investigators (FM&RM). Excluded from analysis were cases in which the diagnosis was doubtful, if no treatment was started, if a follow up appointment was not made or if non-compliance to a first follow-up visit was determined, which is especially important to assess the effect of a possibly given diagnostic block. Data of excluded patients were tabulated (Table 1). All patients had signed informed consent forms prior to intake allowing for the use of anonymized patient related outcome measures. The study protocol was approved by the ethical committee of Máxima Medical Center, Veldhoven, The Netherlands.

### **Specifics of diagnostic evaluation**

Prior to receiving an outpatient invitation, each individual who is presented by a referring party is requested to complete a paper questionnaire including a number of items such as specifics of history, medication use, events possibly provoking the pain, previous and current diagnoses, investigations, imaging and operations, additional comorbidity, duration of symptoms, nature of the pain sensation and the presence of pseudovisceral complaints such as nausea, bloating, or altered defecation, as well as the previously developed 18-item Chronic Abdominal Wall Pain scale shown in Appendix A.<sup>12</sup> A score <10 points is associated with IBS rather than ACNES. Once these data are evaluated and deemed possibly consistent with an abdominal wall pain syndrome, patients are invited for an outpatient evaluation. Completion is required for an invitation.

During a 30 minute primary consultation, the history is confirmed as documented in the questionnaire by one of 3 surgeons and physicians who are highly experienced in the evaluation of chronic abdominal wall syndromes. Numeric pain rating scores (PI-NRS) reflecting the average pain in the week preceding the consultation are obtained. Specific findings of physical examination during intake that were standardly assessed were skin sensibility surrounding the painful point (hypo- or anaesthetic, hyperaesthetic, hyperalgesic), an increase of pain upon simultaneously flexing the abdominal muscles and digital palpation of the painful point (Carnett's test), a disproportionate increase of pain while slightly pinching the abdominal wall (Pinch test) and the presence of painful points along the ipsilateral costal margin to the flank or paravertebral area. This latter phenomenon is often associated with proximal irradiation of neural hyperactivity.

### **Specifics of diagnostic rectus sheath block**

If a combination of history and physical examination suggests the presence of ACNES, the diagnosis is communicated and a subfascial injection of 5-10 ml of 1% lidocaine is administered using a free hand technique, as previously published.<sup>3</sup> Levels of pain are scored immediately before and  $\pm 15$  minutes after injection using PI-NRS. Injections are always provided by one of the four attending physicians. A block is deemed positive if a minimal 50% decrease of PI-NRS is reported. Occasionally, this diagnostic test was not performed if patients refused an injection, if previous injections were administered elsewhere or an allergy for lidocaine was reported.

### **Treatment algorithm**

Based on previous results from our research group, we propose a step-up treatment protocol to each new patient. Starting with minimal invasive therapies such as subsequent tender point infiltrations with a local anesthetic and added corticosteroids, or pulsed radio frequency (PRF) treatment of the peripheral nerve or dorsal root ganglion. Success rates of these therapeutic options, defined as >50% pain reduction, range between 30-50%.<sup>9,12</sup>

A portion of patients is dissatisfied with these treatments alone and opt for a neurectomy. Standard follow-up evaluation is 6-8 weeks after the last injection, PRF treatment or neurectomy. Over the years, some patients explored other treatments such as deep tissue massage, rehabilitation therapy, transcutaneous electric nerve stimulation (TENS), etc.

### Specifics of a neurectomy

During a neurectomy, terminal nerve branches of the n. intercostales are removed at the point of maximum pain over the rectus muscle. This technique was an effective treatment modality in a double blind, placebo-controlled setting.<sup>4</sup> Two types of procedures are performed. The first approach focuses on the nerve terminals at the level of the anterior fascia of the rectus abdominis muscle and obtains adequate pain relief in some 70% of operated patients.<sup>4</sup> Patients who experience insufficient pain relief after this procedure are eligible for a second operation. During this procedure, the neurovascular bundle is identified and removed at the posterolateral border of the muscle. The success rate of this secondary procedure is between 50-60%.<sup>13</sup>

### Statistical analysis

Determinants were analyzed using SPSS 22.0 (IBM, NY, USA) if >85% data was complete. Categorical measures are presented as percentages. Continuous data are presented as mean values (and standard deviation, SD) or median (and range) where appropriate. Analysis of categorical data in subgroups was performed using  $\chi^2$  or Fisher's exact test where appropriate. PI-NRS difference was calculated with Wilcoxon signed rank test.

## RESULTS

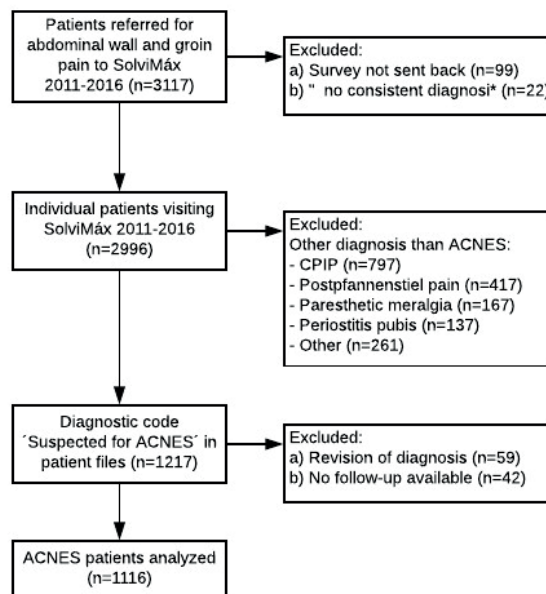
### Selection

A total of 3117 patients were referred during the 4,5 year period of observation. 2996 patients (96%) were evaluated for alleged chronic abdominal wall pain or groin pain after screening of completed questionnaires. Of these, 1217 were coded as having ACNES. The remaining group of patients (n=1779) suffered from a range of abdominal wall and groin pain conditions including inguinal nerve neuropathies such as chronic postherniorrhaphy inguinal pain (CPIP) and postpfannenstiel syndrome. Other diagnoses varied from sportsman's hernias to somatoform disorders. Of the 1217 ACNES patients, 59 were excluded from analysis because the diagnosis ACNES was later rejected or multiple pathologies coincided (e.g. abdominal wall endometriosis and ACNES). Another 42 patients were excluded as outpatient follow up data after the first visit were not available (Table 1). Therefore, the present study is based on 1116 patients diagnosed and treated for ACNES (fig. 1).

**Table 1.** Demographics of excluded patients.

Excluded patients		(n=66)
Age*		47 (8-78)
Sex ratio	M:F	1:3,9
Height (cm)**		171 (8) cm
Weight (kg)**		75 (14) kg
BMI (kg/m <sup>2</sup> )**		25 (4)
NRS normal**		6 (2)
NRS peak**		8 (1)

Abbreviations: NRS = Numeric Rating Scale; BMI = Body Mass Index. Data are presented as medians (\*) with ranges or means (\*\*) with standard deviations, as appropriate, or percentages.

**Fig. 1** Patient selection.

### Subject characteristics (n=1116)

Demographics of the 1116 analyzed patients are depicted in table 2. Median age is 42 (range 7-81). Age peaks were observed around the age of 16 and 40 (fig. 2). The majority of patients is female (3.6:1). BMI is normal ( $24 \pm 9$ ). In most cases (57%), the pain started spontaneously without any evident cause. However, 28% of patients reported abdominal surgery (either open or laparoscopic) as the mechanism of onset. Less often reported etiologies are an accident or a sport's injury (5%), pregnancy (3%) or a flu (3%). A small portion of patients mentioned other triggering events such as IUD placement or a colonoscopy. Two types of pain onset patterns were observed, either gradual (42%)

or sudden (53%). On average, pain was severe as mean NRS scores on a characteristic day were 6 ( $\pm 2$ ) and peaked to 8 ( $\pm 1$ ). Patients scored on average 14 points ( $\pm 2$ ) on the CWAP scale.

**Table 2.** Demographics of 1116 patients.

<b>Included patients</b>		(n=1116)
<b>Age*</b>		42 (7-81)
<b>Sex ratio</b>	M:F	1:3,7
<b>Height (cm)**</b>		169 (10) cm
<b>Weight (kg)**</b>		73 (17) kg
<b>BMI (kg/m<sup>2</sup>)**</b>		24 (9)
<b>Etiology (n)</b>		
Spontaneous		57%
Recent abdominal surgery		28%
Accident/sport injury		5%
Pregnancy		3%
After a flu		3%
Other		3%
Gradual vs sudden onset		42% vs 53%
<b>Duration of pain prior to diagnosis (months)*</b>		18 (1- >120)
<b>Presence of (pseudo) visceral symptoms</b>		47%
<b>Presence other pain syndromes</b>		17%
<b>NRS normal**</b>		6 (2)
<b>NRS peak**</b>		8 (1)
<b>CWAP score**</b>		14 (2)
<b>Referring physician</b>		
1 = General practitioner		40%
2 = Surgeon		22%
3 = Anesthesiologist/pain specialist		11%
4 = Gastrointestinal physician		10%
5 = Pediatrician		5%
6 = Emergency department		4%
7 = Other		7%
<b>Previous treatment elsewhere for ACNES</b>		47%

Baseline patient demographics, pain characteristics and referral information. Abbreviations: NRS = Numeric Rating Scale; BMI = Body Mass Index. Data are presented as medians (\*) with ranges or means (\*\*) with standard deviations, as appropriate, or percentages.

Patients were mostly referred by general practitioners, surgeons and pain specialists but gastroenterologists, pediatricians and gynecologists were also regular referring specialists. Doctor's delay was a median 16 months. Some patients were diagnosed at the emergency department within days after onset, others already had years of complaints and unsatisfactory diagnostic labels before ACNES was considered by a specialist



familiar with the syndrome. Other pain syndromes such as irritable bowel syndrome, fibromyalgia, complex regional pain syndrome and rheumatoid arthritis were present in 17% of the patients.

Pseudovisceral complaints were reported by 47% of patients, predominantly bloating and nausea.

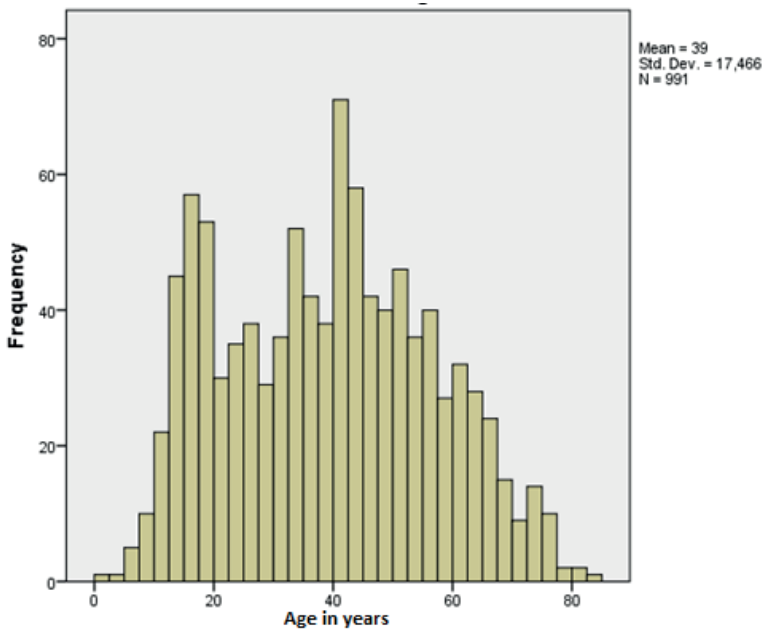


Fig. 2 Age of onset, showing two peaks, around 16 and 40 years.

### Findings during physical examination

Pain characteristics are summarized in table 3. The point of maximum pain was most often encountered (55%) at the right side of the abdominal wall, lateral or just caudal to the umbilicus in dermatome T10 and T11. Positive symptoms associated with ACNES were local somatosensory disturbances (78%), positive skin pinching (78%) and a positive Carnet's sign (87%). Lateral and paravertebral painful points were present in 16% and 15% of patients, respectively. Some 13% of patients had bilateral complaints, usually with two painful points in a mirrored distribution in the right and left hemi abdomen.

Fifteen minutes after a diagnostic rectus sheath block, almost half of patients (42%) demonstrated complete remission of pain. Another 39% reported a minimal 50% pain reduction whereas 19% reported less than 50% pain reduction, or no effect at all.

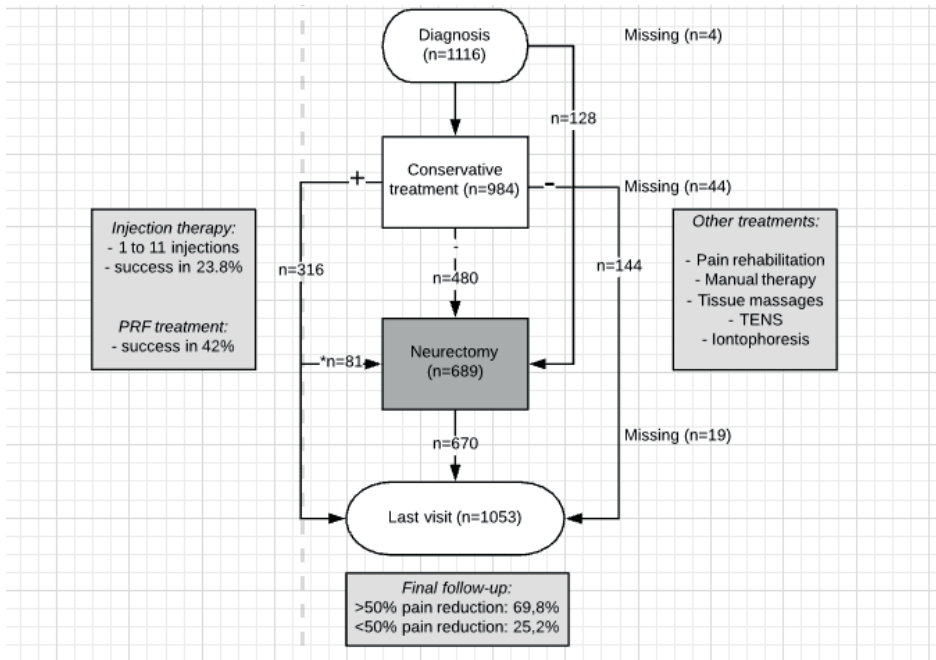
**Table 3.** Pain characteristics and findings in physical examination.

Included patients	(n=1116)
<b>Abdominal wall dermatome of max. pain location</b>	
Th7	2%
Th8	9%
Th9	13%
Th10 (level of umbilicus)	27%
Th11	34%
Th12	14%
<b>Abdominal wall side of max. pain location</b>	
Right	55%
Left	30%
Bilateral	13%
<b>Presence of local somatosensory disturbances around point of max. pain</b>	
	78%
- Hypoesthesia	48%
- Hyperesthesia	20%
- Allodynia	5%
<b>Positive Pinch Symptom</b>	78%
<b>Positive Carnett Symptom</b>	87%
<b>Presence of intercostal painful points</b>	16%
<b>Presence of paravertebral painful points</b>	15%
<b>Reaction modified rectus sheath block after 15 minutes:</b>	
- pain free	42%
- >50% pain reduction	39%
- <50% pain reduction	19%

Findings during physical examination. Baseline patient demographics, pain characteristics and disability scores. Abbreviations: NRS = Numeric Rating Scale; BMI = Body Mass Index. Data are presented as percentages of the entire case series.

### Treatment regimens & therapeutic results

Patient flow during the step-up treatment protocol is shown in figure 3. Of 1116 patients, 128 were excluded from conservative treatment because they had received such treatments elsewhere and were encouraged to proceed with a neurectomy. 984 patients underwent injection therapy or/and PRF, with 316 patients experiencing some >50% pain reduction. Injection therapy success rate was 24%, PRF yielded more success (42%). As 235 patients experienced a long term effect of this conservative treatment, 81 of these 316 patients experienced recurrent symptoms beyond 6 weeks and opted for a neurectomy. Most patients who experienced <50% pain reduction chose to undergo a neurectomy, but some were hesitant towards surgical treatment and explored additional, non-surgical, treatments.



**Fig. 3.** Flow of patients in treatment protocol.

Neurectomy procedures are shown in table 4. First operations predominantly consisted of a neurectomy with an anterior approach; in most second operations, a posterior approach was used. 253 patients underwent a second operation. These are patients whom experienced insufficient pain reduction after the first procedure or had recurrent symptoms beyond 6 weeks. Tertiary explorations or more were reserved for a small group of patients (n=37) after thorough evaluation for the presence of a persistent anatomical substrate.

**Table 4.** Specifics of surgical procedures.

	N	Successful response	Lost to follow-up
First operation	670	72%	(n=27)
Second operation	253	61%	(n=9)
Third or multiple operations	37	68%	(n=1)

Follow-up varied from 12 to 60 months. As treatment efficacy was not the primary focus of this study, no further analyses on outcome issues were performed. Approximately 70% of patients experienced >50% pain reduction at the final visit as recorded in the database, which is consistent with previous reports of our group on outcome data. 1 in 4 patients experienced less than 50% pain reduction.

## DISCUSSION

This study describes the characteristics of the largest case series of ACNES patients to date. Due to our unique position as a tertiary referral center in the Netherlands, a large number of individuals was studied, potentially allowing for an excellent clinical description of the ACNES population. The majority of patients is female of young or middle age with a normal BMI who spontaneously develop a sharp, burning pain, typically in the right lower abdominal quadrant, either suddenly or gradually. The pain is a severe (NRS 6-8 on a 10 point scale) type of chronic abdominal pain that is diagnosed as ACNES after a substantial doctor's delay (median 18 months). These characteristics are largely similar to findings previously reported in much smaller case series.<sup>9</sup>

The long doctor's delay might be attributed to the relative unfamiliarity of physicians with the syndrome, but is surely also caused by possible confusing elements in the patient's history. Visceral (sometimes called pseudovisceral) complaints such as nausea, bloating, increase of complaints after food intake, or altered defecation are present in more than half of ACNES patients suggesting some type of gastro-intestinal disease rather than a neuropathic pain syndrome. However, the typical history of a chronic pain in a predictable small area of the abdomen is unique for ACNES.

Although the authors recognize the description of such a 'typical' ACNES patient, multiple time points in the diagnostic work-up presented in this study allow for specific forms of bias. Since we are a referral centre for alleged ACNES patients, some form of selection bias may be present. Vulnerable patients might not complete questionnaires and could therefore be omitted in the analysis, rendering non-response bias. Three surgeons screened the home completed questionnaires and excluded a small number of patients as results seemed more consistent with alternative gastro-intestinal diagnoses. The diagnostic injection technique has been previously evaluated in a placebo-controlled fashion, but it is not impossible placebo responses may have occurred in this large case series. With regard to treatment results, this study only presents routine, relatively short term follow-up that is however consistent with previous randomized controlled trials. The patency of therapy and recurrence rate will be presented in future studies.

Nevertheless, analysis of the findings in physical examination provide an essential first step in validation of a proposed syndrome definition. Our previously validated questionnaire to differentiate IBS from abdominal wall pain proves to be a helpful pre-screening tool (appropriate scores in 72% of invited patients, median 14/18 points). During the first visit in our center, the diagnosis ACNES is deemed highly likely if a patient with a localized chronic abdominal pain has at least two of the four following characteristics during physical examination: sensory disturbances at the area of maximal pain (either hypoesthesia, hyperalgesia, altered cold perception), a positive Pinch sign, a positive Carnet's sign, and a positive response to a modified local rectus sheath block (>50%

pain reduction). These characteristics are indeed present in the majority of patients (respectively in 78%, 78%, 87%, and 81%). Lateral (along the ribs) and paravertebral tender points are only present in a small portion of patients and may be associated with a poor treatment outcome.<sup>14</sup>

The results confirm that the key elements in diagnosing ACNES remain a thorough history and physical examination. To relate this to a comprehensive syndrome description, however, a thorough understanding of the pertinent anatomy, pathophysiology, and the electrodiagnostic manifestations of its pathophysiology is required. One anatomical case report provides theories regarding the entrapment mechanism of anterior cutaneous nerve branches of intercostal nerves and the complex network they form.<sup>15</sup> Electrodiagnostic studies using quantitative sensory testing have been performed for pre- and post-neurectomy assessment, identifying favorable responders.<sup>16</sup>

The present description of patient characteristics may provide some clues regarding the pathophysiology of ACNES as well. For example, a large subset of patients developed symptoms after either open or laparoscopic surgery or during pregnancy and after trauma, suggesting some kind of mechanical etiology. It is not difficult to imagine that the small anterior nerve branches are at risk of being damaged during a skin incision or following insufflation of the abdominal cavity or elongation and traction forces during pregnancy and trauma, respectively. In relation to previous surgery, pain does not always appear immediately and may in fact arise several years after the initial operation, which could be caused by gradual scarring and fibrosis formation in proximity to the nerve pathway. This 'type of ACNES' might also be reported as post-cholecystectomy pain or another post-abdominal surgery pain syndrome.<sup>17</sup>

In patients who spontaneously developed symptoms, it might be theorized that intermittent entrapment of the nerve has led to sensitization. Due to elevated pressure in the rectus compartment, ischemia and chronic edema of the perineurium and endoneurium arise, possibly leading to dysfunctional firing of the nerve.<sup>18</sup> After the initial traumatic event, instead of returning to their resting state, pain transmission neurons throughout the CNS gain consequent increased excitability due to synaptic plasticity. There is concomitant glial activation both at the segmental level, in a mirror distribution, and around the strained nerve.<sup>19</sup> This is a dynamic process that often spreads proximally from the site of the original event.<sup>20</sup> This might explain the relatively large group of patients with a bilateral, very strict symmetrically, mirrored distribution (in the present series some 13%), as it is unlikely that two separate nerves become entrapped at exactly the same anatomical level of the right and left m. recti, although not impossible.

Apart from these mechanical injury and entrapment theories, so called referred pain mechanisms or segmental relations might also play an important role in a substantial portion of ACNES cases.<sup>21-23</sup> Viscero- and somatoafferent (nociceptive) neurons converge at the level of the dorsal root ganglion and as such abnormal activity of an organ (as

in transient disease) can be interpreted by the brain as a stimulus originating within the same segment, such as for example the same dermatome or myotome. Presenting themselves with local sensory disturbances and pain, the underlying cause in these patients might not initially be of primary neuropathic origin, but still originating from a visceral event. This has indeed been observed in patients presenting with a (later) proven acute appendicitis.<sup>24</sup> Since various pathophysiological pathways may possibly lead to the clinical manifestation of ACNES, future research should focus on the development of quantitative diagnostic tools and exploring tailor-made treatment options.

## CONCLUSION

A combination of typical findings in history and physical examination, combined with a positive modified rectus sheath block may allow for diagnosing ACNES in patients with chronic abdominal pain. Physicians should be aware that “pseudo” visceral symptoms such as nausea, bloating, diminished appetite or altered defecation are also associated with this syndrome and their presence does not exclude this diagnosis. The typical ACNES patient is a young or middle-aged female with severe continuous right-sided lower abdominal pain that developed spontaneously without any evident cause. A subgroup of patients may present themselves with bilateral symptoms or tender points along the trajectory of the intercostal nerve, which could be suggestive of central sensitization of an initial localized neuropathic pain entity. Treatment results in this population are consistent with previous randomized controlled trials.

## APPENDIX. A.

### Appendix. A. Chronic Abdominal Wall Pain questionnaire. An 18-item scale to which patients can get a maximum of 18 points. >10 points is associated with ACNES rather than IBS.

For me pain dominates over discomfort	(yes=1, no=0)
Pain is always located on the same spot(s)	(yes=1, no=0)
Pain is located just lateral to the midline of the abdomen	(yes=1, no=0)
The most intense pain can be localized by the tip of one finger	(yes=1, no=0)
I believe the pain is originated just beneath the skin	(yes=1, no=0)
Pain is provoked by daily activities (eg, walking, sitting, cycling, bending)	(yes=1, no=0)
Lying on the affected side aggravates the pain	(yes=1, no=0)
Pushing on the painful spot aggravates the complaints	(yes=1, no=0)
Coughing, sneezing or squeezing aggravates the pain	(yes=1, no=0)
The painful spot feels strange, different or dull	(yes=1, no=0)
I believe the complaints originate from my gastro-intestinal tract	(yes=0, no=1)
Pain exists on different spots all over the abdomen	(yes=0, no=1)
Complaints are somehow related to an altered defecation pattern	(yes=0, no=1)
Stress provokes the complaints	(yes=0, no=1)
I experience bloating or a feeling of gas in the intestines	(yes=0, no=1)
The stool has an abnormal consistency (eg, hard and small, pencil thin, loose, watery)	(yes=0, no=1)
I feel urgent need for bowel movement without producing stool (incomplete defecation)	(yes=0, no=1)

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