Observational Assessment

Iliocostalis Thoracis-Lumborum Myofascial Pain: Reviewing a Subgroup of a Prospective, Randomized, Blinded Trial. A Challenging Diagnosis with Clinical Implications

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Background: Pain of myofascial origin is a well-recognized pathology characterized by the presence of two components: referred pain; which is often distant from its source and specific to each muscle, and the trigger point, a localized hyperirritable band present in the affected muscle and able to reproduce the referred pain when stimulated. Myofascial pain (MP) commonly coexists in patients with acute or chronic pain of other etiologies. The uniqueness of the clinical presentation of some MPs and the lack of training of most specialties represent a clinical challenge. Thus, many patients with MPS receive less than optimal management of this condition.

Objective: Pain at the anterior torso, originating at the posterior torso, can mimic common pathologies that correlate with the same anatomical area such as cardiac and intra-abdominal conditions. These clinical characteristics could be caused by MP of the iliocostalis thoracis-lumborum (ITL) muscle. However, this entity has not been well addressed in the medical literature. In this report we characterize the manifestations, diagnosis, and clinical implications of ITL MP.

Study Design: Observational assessment.

Setting: Two university-based academic emergency medicine departments (ED) in an urban setting in the United States.

Methods: A convenience sample of 43 patients who presented to the ED with pain at the anterior aspect of the torso (chest, abdomen, or pelvis) and clinical evidence of MP originated in the ITL muscle.

Of a clinical trial of patients with MP, we describe a subgroup of patients with MP of the ITL which was clinically evident by the presence of a trigger point (TP) in its ability to reproduce the referred pain present at the anterior aspect of the torso. Patients received a TP injection. In this trial we intend to demonstrate that TP injections using particulate steroids mixed with a local are no more effective than saline alone to treat MP. The primary outcome was pain control (decrease in intensity of 50% or more below baseline numeric pain rating). A follow-up telephone interview was performed by third-party abstractors.

Results: Forty-three patients presented with pain of the anterior torso and ipsilateral back, both correlating with the level of the TP of the ITL muscle. The pain had been present from 2 days to 7 years. The most common locations of pain were the right-lower quadrant and the left side of the chest. In many of them a pattern of missed diagnosis was evident despite extensive workups and consultations. Only 17 patients were able to identify the precipitating event; the most common was coughing. Two weeks after TP injection, all patients still had satisfactory pain control. After treatment, no missed pathology or returns to the ED were reported.

Limitations: This descriptive portion of the ongoing study does not affect the integrity of the trial itself but could be subject to the introduction of subject selection and selective reporting bias. Similarly, this convenience sample does not establish the incidence of this pathology and challenges the external validity to other clinical settings.

Conclusions: Anterior torso pain often resulted in extensive workups before ITL myofascial pain was diagnosed. TP injections were diagnostic and therapeutic of ITL myofascial pain.

Key words: Iliocostalis thoracis-lumborum muscle, myofascial pain, referred pain, trigger point injection

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Myofascial pain (MP), pain originating in the myofascial tissue, is a commonly recognized condition that can compromise any of the estimated 400 muscles of the human body. MP is characterized by pain of the affected muscle and the presence of a non-dermatomal pattern of referred pain that is specific to each individual muscle. The referred pain of MP can be distant from its origin; it can display a peripheral, central, or local distribution. The presence of a trigger point, a localized hyperirritable muscle band able to reproduce the pain and its associated symptoms, constitutes the clinical landmark of MP. Presumably, MP is a common component of most chronic pain syndromes. In fact, MP is calculated to be present in 10% of the U.S. population and is considered the main cause of disability among working-age individuals (1,2). In addition, pain is the reason for up to 78% of visits to the emergency department (ED) (3); however, the prevalence of MP in this setting is unknown because it is commonly undiagnosed. The lack of familiarity with MP by many specialties has been documented (4); presumably because this entity is considered of low acuity by many, since it does not represent a threat to life itself.

As with other disciplines, emergency medicine physicians are traditionally not trained to diagnose and treat MP. Thus, the diagnostic accuracy and the outcomes of the therapy of MP are frequently unknown. Additionally, the referred pain associated with MP complicates the clinical diagnosis since its location can mimic other pathologies. Using a traditional diagnostic approach, the anatomic location of the pain drives the use of imaging and laboratory tests. This can result in expensive workups, unnecessary in-hospital care, and prolonged visits to the ED. Unsurprisingly, since the referred pain of MP of the iliocostalis thoracis-lumborum (ITL) muscle is located at the frontal aspect of the torso (chest, abdomen, and pelvis) (5) (Fig. 1), it can represent a clinical challenge even to seasoned clinicians.

In our ED, emergency medicine residents receive didactic material, lecturing, and bedside teaching about the diagnosis and treatment of several types of MP. In addition, we are currently conducting a clinical trial of patients with common MP including ITL. Because the literature on ITL MP is sparse, we considered it relevant to discuss the current findings on this subgroup of our trial. We characterized the manifestations, diagnosis, and clinical implications of ITL MP in patients seen in our urban-setting academic ED.

Methods

We are currently conducting a prospective, randomized, blinded trial of patients with MP (ClinicalTrials.gov HSC-MS-14-0072 NCT02120261). In this non-inferiority trial, we are comparing the effectiveness of trigger point (TP) injection therapy with normal saline solution vs. a commonly used mix of local anesthetics with steroids. To date, we have identified a descriptive series of patients with MP of the ITL muscle. In this subgroup, patients were complaining of pain compromising the anterior aspect of the torso. Pain was reproducible by palpation of the TP located in the ITL muscle at a correlating level (Fig. 1). Once identified and under sterile conditions, the TP was injected using 5/8-inch, 25-gauge needles. The injection contained 1 mL of the pre-coded solution (either normal saline alone or lidocaine 1%; 10 mL+ triamcinolone acetonide 40 mg/mL). The injection was performed under the supervision of the study faculty unless the provider was already considered proficient in this technique. We performed injections of the TPs in order to achieve pain control. We also conducted follow-up telephone interviews 2 weeks after the ED visit. Since our trial is still ongoing, the blinding has not yet been uncovered, we considered it unnecessary due to the descriptive intention of this report. The follow-up telephone call or email, which employed a scripted questionnaire about the recurrence of pain and general well-being, was performed by abstractors unaware of the given therapy.

Study Setting and Population

All patients were identified at one of 2 academic EDs in Houston, Texas: one at a tertiary-care hospital with an ED census of 75,000 patients per year, and one at a suburban hospital with an ED census of 85,000 patients per year.

Selection of Cases

Through our screening we identified patients who presented to the ED with the following:

Pain at the anterior aspect of the torso (chest, abdomen, or pelvis) and concomitant non-dermatomal back pain at the same level (Fig. 1)

- Pain usually described as aching, dull, or pressure worsened by torso flexion and rotation
- Review of systems grossly negative for systemic complaints
- Presence of a TP of the ITL able to reproduce pain of anterior torso

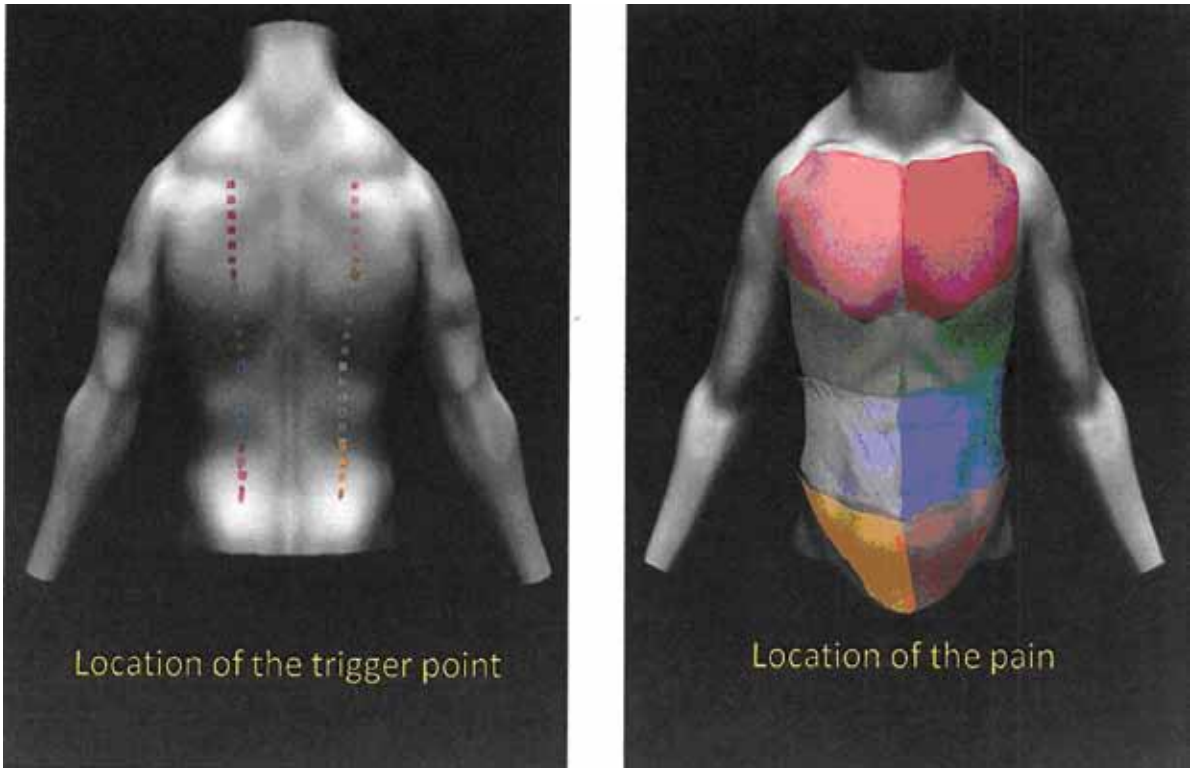

Fig. 1. *Graphic representation of the anatomical location of the ilicostalis-thoracis-lumborum muscle and the virtual location of the trigger points. Trigger points correlate with the area of referred pain in the anterior torso.*

- Negative imaging and absence of other clinical findings that could explain the symptoms
- Pain resolved by injection of the TP of the ITL muscle

For patients with chest pain and no prior workup, we conducted a risk stratification for cardiovascular disease as a potential cause of the pain, using a pre-established list of risk factors (age, smoking, diabetes mellitus, hypertension, hypercholesterolemia, and obesity) and an additional factor, cocaine abuse. Adequate testing and disposition was conducted as indicated.

Ethical Considerations

The data collection was approved by the local Institutional Review Board of the University of Texas Health Science Center. The initial and follow-up assessments of the patients were deemed to be good medical practice. Patients provided written informed consent to participate in the study and to be contacted for follow-up by email or by phone.

Treatment

Once the TP of the ITL was identified, the randomly pre-assigned agent was injected. Following the injection, patients were instructed to perform active flexion of the torso, an activity that was limited by pain in most prior to the injection. The same instructions were given to be done at home as part of the rehabilitation plan for ITL MP.

Data Collection

Information on each patient was entered into pre-printed data sheets, then collected into an electronic database for summarization and statistical processing. The data collected included patient demographics, possible causative factor, pain medications received before and after TP injection, and pain scores. Pain scores were self-reported by patients using a numeric rating scale (NRS) from 0 to 10 (0 being the absence of pain and 10 the worst pain imaginable). Pain scores were documented separately for the anterior torso and back at

initial presentation, before TP therapy, after injection, and prior to discharge. Also 2 weeks after the ED visit.

Statistical Analysis

Descriptive statistics were calculated for patient characteristics, pain scores, and trigger events. Variables of the ITL data were described as median and Interquartile range (IQR) for continuous variables and as count and percentage for categorical variables. As an ordinal variable, pain severity and the relationship between anterior torso and back pain was assessed using Spearman's correlation coefficient. The statistical analysis was carried out using SAS 9.4 software (SAS Institute, Cary, NC). This test was conducted with the assumption that the pain NRS score of anterior torso and ipsilateral back were unrelated.

Results

Patients

We identified an initial sample of 52 patients who presented to either of the 2 EDs who met the inclusion criteria for ITL MP. No patient was febrile, and other vital signs, including blood pressure, heart rate, respiratory rate, and pulse oximetry, were within levels of no clinical concern. Five patients were excluded due to a clinical indication for extended workup and a need for admission to the hospital for reasons other than the MP. Three patients declined the TP injection because of fear of needles. One patient accepted the TP injection but declined to participate in the study and declined follow-up. Thus, 43 patients have been included in the final describing group.

The patients included were 18 to 64 years old (mean/median ages 42.5/46.0 years). Twenty-nine were women. Patient characteristics are summarized in Table 1.

Anterior Torso and Back Pain

Anterior torso pain was most commonly described to be at the right lower quadrant (n = 12) and the left chest wall (n = 9). The intensity of the pain was graded as severe in most patients (a score of 10 in 15 patients and a score of 8 in 10 patients) (Table 1). The possible causative factor was unknown by most (n = 26); others identified coughing as the most likely trigger event (n = 7) (Table 1). The duration of the pain ranged from 2 days to 7 years (Table 2).

The median torso pain level was 8.5 (IQR 7, 10), while the median back pain level was 7.0 (IQR 6, 10). The majority of the patients, 74% (n = 32), only acknowledged the back pain when asked during the review of systems (Tables 1 and 3).

Spearman's correlation between torso and back pain was 0.725 (95% CI 0.537, 0.844, $P < 0.001$), suggesting a correlation of intensity between torso pain and back pain. Still many patients did not include back pain as part of their main complaint.

Prior to visiting the ED, all patients had taken analgesics, either obtained over the counter or provider-prescribed. The previous workup for each patient is summarized in Table 3. In previous encounters, 46.6% (n = 21) of the patients had undergone prior significant testing; some of the tests are considered advanced techniques such endoscopic retrograde cholangio-pancreatography and cardiac stress test among others. Three of the patients had received several days of inpatient care that yielded no final diagnosis. Thirty-eight patients had multiple documented evaluations in the primary care setting, the ED, or both for the same complaint. Eleven patients were previously seen by other specialties, including cardiology, gastroenterology, gynecology, pulmonology, and surgery (Table 3). In 5 patients, the TP injection was considered both diagnostic and therapeutic. In those individuals, no clinical indication for imaging or laboratory testing was found; there was also no clinical evidence of an alternative diagnosis.

Treatments

In the ED, prior to the TP injection, 28 patients received intravenous opiates, 15 received nonsteroidal anti-inflammatory drugs (NSAID); 7 received both. Five patients also received muscle relaxants (all in combination with NSAIDs). Pain control was not accomplished with this approach. Patients were then enrolled in the study. Localized bleeding at the needle insertion point, if present, was easily controlled with localized pressure; no other adverse effects of the therapy were experienced. Pain control, the main outcome of the study (intensity decreased by 50% or more below baseline NRS score) was achieved with TP injection in all cases.

Follow-up

Follow-up occurred at 2 weeks after the ED visit. No additional medical visits for the same complaint were documented. No missed diagnosis potentially explaining the symptoms was evident.

Discussion

Outside the anatomy field, the medical literature has rarely addressed the clinical importance of the

Table 1. *Summary of demographic and baseline variables (n = 43 individuals).*

Categorical Variables	Category	Number of Patients	Percentage (%)
Gender	Male	14	31.0
	Female	29	69.0
Pain Severity (Initial)	6	4	9.5
	7	8	19.0
	8	10	21.4
	9	6	14.3
	10	15	35.7
Pain Location	Bilateral HA	1	2.4
	LC	9	19.0
	LHA	5	11.9
	LLQ	3	7.1
	RC	6	14.3
	RHA	2	4.8
	RLQ	12	28.6
	RLQ/LLQ	1	2.4
	RUQ	3	7.1
	RUQ/RHA	1	2.4
Trigger Event	Blunt Trauma	1	2.4
	Coughing	7	16.7
	Delivery	1	2.4
	Fall	2	4.8
	Lifting	2	4.8
	Motor vehicle crash	2	4.8
	Vomiting	2	4.8
	Unknown	26	59.5
Quantitative Variables	**Number of Patients**	**Mean/Median**	**Range (Min-Max)**
Age (Years)	43	42.5/46.0	18 – 64
Pain Duration (Years)	43	0.5/.0563 About 6 months/3 weeks	0.0055 – 7 (2 days to 7 years)

HA: hemi-abdomen, RC: right chest, RUQ: right upper quadrant, RHA: right hemi-abdomen, RLQ: right lower quadrant, LC: left chest, LHA: left hemi-abdomen, LLQ: left lower quadrant

Table 2. *Duration of pain prior to presentation (n = 43).*

Time Frame	Number of Patients	Percentage
2 days to 8 days	13	31.0
14 days to 30 days	11	26.2
6 weeks to 6 months	12	26.2
1 year to 7 years*	7	16.7

* 6 (15%) individuals with 1 – 3 years of pain and one individual with 7 years of pain

Table 3. *Individual patients' demographics, pain characteristics, and workup (prior and at the time of presentation).*

N	S	Age (Yr)	Pain Duration	Pain Severity	Pain Location	Possible Etiology	Pain Back	Workup Prior to Diagnosis
1	M	23	4 d	6	RLQ	Unknown	6	CT a/p X2, Inpt X2 days, ED X2
2	F	57	2 y	9	LLQ	Unknown	8	CT a/p, US, GI, GYN, ED
3	F	21	60 d	7	RHA	Unknown	7	EGD, Colonosc, US, ERCP, PCP/GI X2, ED X2

Table 3 (cont.). *Individual patients' demographics, pain characteristics, and workup (prior and at the time of presentation).*

N	S	Age (Yr)	Pain Duration	Pain Severity	Pain Location	Possible Etiology	Pain Back	Workup Prior to Diagnosis
4	F	56	6 d	8	RUQ	Fall	4	ED
5	F	25	2 d	9	RC	Lifting	8	CXR, PCP, ED
6	F	18	7 d	8	RUQ	Unknown	6	CXR, US, ED
7	F	24	8 d	7	RUQ	Vomiting	5	CT a/p, US, GYN, ED
8	F	23	30 d	8	RLQ	Unknown	7	CT a/p, ED
9	F	23	20 d	7	LHA	Unknown	4	CT a/p, Inpt X4 days, ED
10	M	56	4 d	10	RHA	Unknown	10	ED
11	F	62	20 d	7	LC	Unknown	7	CT chest, Stress T, Cardio, ED
12	M	56	20 d	8	RC	Coughing	6	ED X2
13	F	47	2 y	10	LHA	Unknown	10	CT a/p, ED X4
14	F	43	5 d	8	LLQ	Unknown	2	CT a/p, US, ED X2
15	F	31	3 d	10	RLQ	Unknown	10	ED
16	M	28	6 m	10	B HA	Unknown	10	CT a/p X3, ED X5
17	F	55	6 m	10	RC	Unknown	4	Cardio, Stress T, ED
18	F	37	60 d	7	RLQ/LLQ	Unknown	7	US, CT a/p, ED X2
19	M	36	18 d	6	RLQ	Coughing	4	CT a/p, ED
20	F	34	4 w	8	LHA	MVC	5	CT a/p, ED X2
21	M	14	4 d	6	RLQ	Unknown	5	US, CT a/p X2, Inpt X2 days, PCP X2, ED X2
22	M	56	1 y	10	RLQ	MVC	10	CT a/p X3, PCP X4, Sx X3, ED X4
23	M	42	4 d	8	LC	Coughing	8	CXR, ED
24	M	50	1 y	6	LC	Unknown	4	CXR X5, CT chest, PCP X4, ED X5
25	F	56	16 d	7	RLQ	Unknown	4	CT a/p, ED X2
26	F	19	3 w	9	RC	Unknown	8	CXR X3, CT chest, PCP X2, ED X3
27	M	58	5 d	10	RLQ	Unknown	10	PCP, ED
28	F	49	2 w	7	RLQ	Unknown	6	ED
29	F	46	4 d	10	RLQ	Unknown	8	ED
30	F	38	7 y	10	LLQ	Labor	6	CT a/p X3, MRI, US X3, Colp, ED
31	F	28	14 d	10	RC	Cough	10	CXR X2, CT chest, ED X3
32	F	56	6 w	10	RLQ	Trauma	10	CT, US, CXR, PCP X3, ED
33	F	46	10 w	10	LHA	Fall	10	CT a/p, PCP X2, ED X2
34	F	56	10 w	7	RUQ/RHA	Vomiting	7	US, CT X2, ERCP, GI, ED X3
35	F	35	10 w	9	LC	Coughing	8	CXR, CT chest, Stress T, Cardio, PCP, ED X3
36	F	42	6 m	10	LC	Coughing	6	CXR X4, CT chest, PCP, Pul, ED X4
37	F	50	12 w	10	LHA	Unknown	10	Colp, US, CT a/p X2, PCP, GYN, ED X2
38	M	56	3 y	10	RLQ	Unknown	10	CT a/p X4, Inpt X10 days, ED X5
39	M	64	2 y	6	RLQ	Unknown	6	CT a/p, US, KUB, ED X2
40	M	46	4 d	8	LC	Working	6	CXR, Cardio, PCP, ED
41	F	53	6 d	9	LC	Unknown	8	PCP, ED
42	F	27	2 w	9	RC	Coughing	9	PCP, ED
43	M	56	6 m	8	LC	Unknown	4	CXR X5, Cardio X2, Inpt X2 days, PCP X3, ED X3

RC: right chest, RUQ: right upper quadrant, RHA: right hemi-abdomen, RLQ: right lower quadrant, LC: left chest, LHA: left hemi-abdomen, LLQ: left lower quadrant, B: bilateral, MVC: motor vehicle collision, CXR: chest x-rays, CT a/p: computed tomography scan of abdomen and pelvis, CT chest: computed tomography scan of chest, US: ultrasound, Colonosc: colonoscopy, EGD: endoscopy, ERCP, Endoscopic retrograde cholangio-pancreatography, Stress T: stress test, Colp: colposcopy, MRI: magnetic resonance imaging, KUB: kidney-ureters-bladder x-rays, ED: emergency department, GI: gastroenterology, GYN: gynecology, Cardio: cardiology, Pul: pulmonology, Sx: Surgery, Inpt: inpatient care, PCP: primary care provider. Pain severity and Back pain columns in 1 – 10 numeric pain scale.

iliocostalis muscle. The anatomical properties of this muscle are reflected in its participation in the erection of the body, the side-to-side rotation of the spine, and the stabilization of the spine during shoulder and pelvis movement. More than a solo player, the iliocostalis muscle is considered synergistic to other muscle groups. Consequently, many might consider the ITL of secondary relevance in clinical practice. However, although MP originating in the iliocostalis muscle might not represent a threat to life itself, it can be a threat to the quality of life. Our descriptive data demonstrate that MP of the ITL might falsely resemble life-threatening conditions. Thus, MP presents a clinical challenge even to seasoned clinicians. We have also shown that in most cases this entity can be successfully addressed through TP injection, and apparently the injection itself rather than the substance injected is the appropriate therapeutic modality.

Anatomy

The iliocostalis muscle has 3 anatomical components with different areas of insertion; understanding these clarifies its function and likely mechanism of injury.

Iliocostalis cervicis (cervicalis ascendens), the cervical portion, arises from the angles of the third, fourth, fifth, and sixth ribs and is inserted bilaterally into the posterior tubercles of the transverse processes of the fourth, fifth, and sixth cervical vertebrae (C4, C5, and C6) (Fig. 2). The blood supply originates in the muscular branches of the aorta, and its innervation is provided by dorsal rami of spinal nerves. The iliocostalis cervicis participates in the extension of the vertebral column, maintenance of erect posture, and stabilization of the vertebral column during flexion in the upper portion of the torso. It also acts in contrast to abdominal muscles and in opposition to the action of gravity. When used unilaterally, it is a lateral flexor and a same-side rotator (6,7).

Iliocostalis thoracis (iliocostalis dorsi), the thoracic segment of the muscle, originates in the superior borders of the angles of the lower 6 ribs, medial to the proximal tendon of the iliocostalis lumborum. It ends in the superior borders of the angles of the upper 6 ribs and the posterior aspect of the transverse process of C7 (Fig. 2). Its blood supply is provided by the dorsal rami of the posterior intercostal arteries, and it is innervated by the dorsal primary rami of T1 to T12. When acting bilaterally, it participates in the extension of the thoracic spine in synergy with the iliocostalis cervicis, iliocostalis lumborum, longissimus cervicis, spinalis thoracis, semispinalis cervicis, and semispinalis thoracis muscles. When acting unilaterally, it is a lateral flexor of the thoracic spine (6,7).

Iliocostalis lumborum, the lumbar portion of the iliocostalis muscle, originates in the iliolumbar fascia, the posterior medial lip of the iliac crest, the lateral crest of the sacrum, and the spinous processes of T11 to L5. The insertion is at the inferior border of the angles of the lower 6 or 7 ribs (Fig. 2). Similar to the thoracic segment, the blood supply is provided by the dorsal rami of the posterior intercostal arteries, as well as by the dorsal branches of the subcostal arteries and the dorsal branches of the lumbar arteries. The innervation is provided by the dorsal primary rami of T11 to L5. When exerted bilaterally, it provides resistance when the body bends forward and provides the force necessary to bring the body back into an upright position. During full torso flexion, the iliocostalis lumborum is relaxed and transfers the load to the ligaments. When it returns

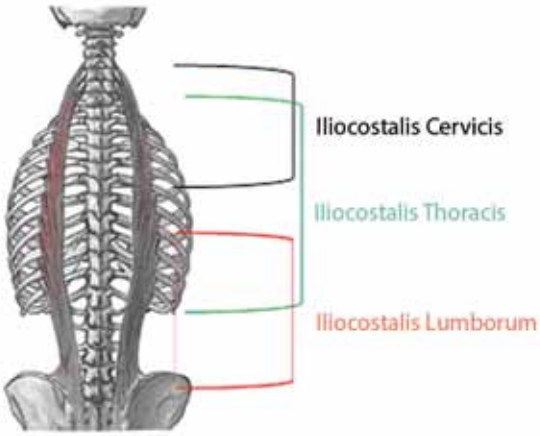

Fig. 2. *Anatomy of the iliocostalis-thoracis-lumborum muscle. Iliocostalis cervicis: the cervical portion, arises from the angles of the third, fourth, fifth, and sixth ribs and is inserted bilaterally into the posterior tubercles of the transverse processes of the fourth, fifth, and sixth cervical vertebrae (C4, C5, and C6). Iliocostalis thoracis: the thoracic segment of the muscle, originates in the superior borders of the angles of the lower 6 ribs, medial to the proximal tendon of the iliocostalis lumborum. It ends in the superior borders of the angles of the upper 6 ribs and the posterior aspect of the transverse process of C7. Iliocostalis lumborum: the lumbar portion originates in the iliolumbar fascia, the posterior medial lip of the iliac crest, the lateral crest of the sacrum, and the spinous processes of T11 to L5. The insertion is at the inferior border of the angles of the lower 6 or 7 ribs.*

from full flexion, the iliocostalis lumborum remains relaxed and transfers the tension to the hamstrings and gluteus maximus (5-7).

Causative Factor

Medical professionals have not yet reached a consensus about the etiology of MP. In general, direct and indirect trauma and microtrauma of muscle fibers seem to be the most commonly agreed-upon etiologies (8). Proposed predisposing and perpetuating factors include improper postural habits and skeletal asymmetry; repetitive localized muscle stress; nutritional deficiencies; sleep disorders; physical inactivity; muscle fatigue; aging; fractures; surgical incision healing sites; electrolyte imbalance; iron deficiency anemia; hypovitaminosis of B-1, B-6, B-12, or C; radiculopathy; visceral disease; depression; hypothyroidism; hypoglycemia; hyperuricemia; and infectious and inflammatory conditions (9-11).

In normal conditions, voluntary trunk movement and maintenance of trunk stability require specific and coordinated muscular activity. Each movement depends on a synchronized muscular combination of internal forces (12). In a myoelectric study participants carrying a load of 5 kg in front of the trunk showed increased activity of this muscle; a decrease of activity was observed when the load of 5 kg was carried on the back (13). In another observational study of repetitive lumbar flexion during rowing, despite the ITL's lack of an active role in torso flexion, fatigue of the erector spinae muscles (including ITL) was evident (14). This suggests that the passive trunk-stabilization role during trunk flexion and active during posture normalization might contribute to the development of MP of the ITL. Similar dynamics are evident during occupational overuse by gravity-opposing during prolonged erection of the trunk, advanced gestation, morbid obesity, premorbid skeletal conditions, and unbalanced positioning such as leg length discrepancy and sacroiliac joint (SI) dysfunction.

In most cases, clinicians and patients search for an obvious traumatic event to explain the origin of MP. Our data demonstrate that ubiquitous precipitating factors are common and easily undermined. The antagonizing role of the ITL to the rectus abdominis and the external and internal abdominal oblique muscles increases the potential of injury during labor, retching, and vomiting. Similarly, the torso-stabilizing functions and the presence of the ITL in the angle segment of virtually all the ribs increase its vulnerability to acute harm during respiratory distress and coughing. Our data showed that the majority of patients with MP of the ITL were unable to establish an etiologic source such as back injury. However, innocuous precipitating factors such as coughing or vomiting were clearly pinpointed by several individuals as the precipitating event.

Clinical Presentation

One of the clinical landmarks of MP is the presence of pain in uninjured tissues distant from the MP of origin (15). Such referred pain is distributed in a non-dermatomal peripheral, central, or local fashion (Fig. 1). This distant nociception can be one of the most important pain generators and originators for central sensitization. This phenomenon affects how the spinal neural circuits respond to different stimuli, and it leads to lowered pain thresholds in both the uninjured and injured areas of the body (16). The location of the referred pain at the anterior aspect of the torso is, without a doubt, the most significant clinical challenge in the diagnosis of MP of the ITL. The location of pain in areas such as the left chest or the right lower quadrant can raise serious concerns about the differential diagnosis. Critical judgment is imperative in order to rule out life-threatening pathologies. Thus, in many cases, extended imaging and testing might be justified (Fig. 1).

As noted in our preliminary data, 74.4% of the patients with MP of the ITL did not report their back pain as part of their main complaint upon ED presentation. The back pain appears to assume a secondary level of concern. Therefore, the diagnostic effort is directed at ruling out other pathologies located at the anatomical area of compromise.

Most authors agree that pain of myofascial origin is commonly reported by patients as moderate to severe in intensity, steady, aching, and deep in quality. MP is reproduced by direct palpation to the area compromised by referred pain and the muscle of origin. Pain is also present during active or passive use (passive stretching or active contraction). In the case of ITL, torso flexion is limited by stiffness and pain. Depending on the area of compromise, pain is also induced by deep inspiration (which can be falsely interpreted as shortness of breath), coughing, torso rotation, and elevation of the upper limbs. Comfort positioning can be limited, affecting the quality of sleep and therefore the quality of life of the patient.

MP should be suspected in patients with stable hemodynamic conditions in the presence of severe pain with poor analgesic response to opiates, unremarkable

review of systems, and the absence of an alternate diagnosis. Patients with chronic MP might show previous negative workups and recurrent medical visits for unresolved pain, a reason why they are frequently misclassified as having aberrant behavior. The precise location of the TP can be a determinant factor for diagnosis and treatment of MP of the ITL. Clinically, the muscle is located bilaterally in an axial fashion parallel to the spinal line at the level of the costal angles (Fig. 1). The muscle lies externally to the longissimus thoracis muscle and is palpable approximately in a mid-distance between the spinal processes and the external contour of the torso; its small volume, flat complexion, and deep location explain the inability to be palpated, especially when extra adipose tissue is present. Of note, the cervicis pars and the upper portion of the thoracis can be obscured by the presence of the scapula in a neutral position. For better exposure of the upper ITL, patients should be asked to hand-reach for the opposite shoulder. A deep palpation of the described axial zone should display a TP able to reproduce the referred pain that correlates in a non-dermatomal fashion with the level of the symptoms (Fig. 2).

The differential diagnostic probabilities based on individual locations of pain are beyond the scope of this report. However, it is important to mention the quadratus lumborum muscle, a lateral flexor of the lower spine. MP of the quadratus lumborum has clinical similarities to MP of the lumbar portion of the ITL; its referred pain is located at the lateral-lower quadrants of the abdomen. However, the anatomy, function, causative factor, and TP location are different.

The chronification of the pain and recruitment of compensating and synergistic muscles as a result of antalgic positioning and overuse can evolve into a self-perpetuating cycle. Multi-muscular involvement can manifest as nonspecific back pain, which is more difficult to treat especially in the presence of comorbidities or other pain syndromes (17,18).

Treatment

No standard treatment protocol for MP is currently available. Other therapies considered more effective than analgesics for treating MP include a variety of invasive and non-invasive procedures (19,20). Noninvasive techniques for pain management include spray (freeze) and stretch, laser therapy, physical therapy, ultrasound-based interventions, electrical stimulation interventions such as transcutaneous electrical stimulation (TENS), and magnetic stimulation. Invasive techniques are considered more effective and therefore are more commonly used. In our environment, we find it more practical to treat MP with TP injections, but other techniques can be used based on level of expertise and resources available. The success of the TP injection needs to be supplemented by educating patients on how to prevent further injury and how to facilitate muscle rehabilitation. Our patients with MP of the ITL were instructed to perform torso flexion twice a day, since a passive stretching of the ITL was considered an appropriate preliminary therapy.

Limitations

The observational design of the current study and the limitations on time and location of this registry may have introduced significant biases, including selection, ascertainment, and selective reporting bias. However, the nature of the descriptive findings does not support a different methodology. Patients, pharmacists, abstractors, and biostatisticians were blind to the study arms. However the physical appearance of the injections one clear (saline) and the other white (steroid) could not be blinded to the injector.

Conclusions

Myofascial pain syndrome of the ITL is more commonly seen in acute clinical settings such as the ED. The ability to diagnose iliocostalis myofascial pain syndrome can reduce patient suffering and the cost of care. Pain at the anterior aspect of the torso is perceived as a medical emergency by both patients and clinicians.

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