Pseudoradicular syndromes of myofascial origin and paradigm-related diagnostic problems

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Myofascial pain (MP) syndromes yielded by trigger points (TrPs) are perhaps the most frequent, misunderstood and underscored painful disorders reported by patients, which may still lead to misdiagnosis and wrong interventions[1]. In fact, MPS can be more or less localized or spread from one region to another and can virtually involve any part of the body: this makes MP able to mimick other diseases, specially when the clinician is (wrongly) inclined to perceive pain as a symptom of an underlying, organic, disease. For example, MP may be taken for temporomandibular disorders, the so-called atypical trigeminal neuralgia, radicular pain from cervical or lumbar herniated disk[2,3]. MP syndromes may also be taken for diseases of internal organs when thoracic, lumbar, abdominal or pelvic muscles are involved. As far as atypical trigeminal neuralgia is concerned, it is worth emphasizing that this term, despite still used in clinical practice, has been withdrawn from the classification of the International Classification of Headache Disorders, 2nd edition[4] and substituted by the term *Persistent Idiopatic Face Pain*, recognizing its non neuralgic origin: in most cases it may depend on TrPs of face and neck muscles, which may be the main factor or be associated components of other disorders such as malocclusion and temporomandibular dysfunction.

In the US it has been estimated that some 75.00.000 of people reports chronic pain, which in most cases involves the orofacial region[5,6]. These patients frequently undergo misdiagnosis and multiple failed or wrong interventions, where surgery rarely may provide pain relief, while inappropriate treatments may help exacerbating and perpetuating pain[7]. Likewise, cervical and low back pain may arise from a large variety of both organic and functional mechanisms (including MP, disc herniation, radiculopathy, spinal stenosis and facet syndrome), making impossible any simple, single solution to them. Here also the role of surgery and all interventions directed toward the coexistent anatomical abnormalities may be disappointing, when functional components, especially MP, are skipped, with an undue increase of social and economic cost. The risk of wrong surgical and other invasive treatment with their iatrogenic consequences and costs has cultural implications, which call for shortly outlining their main shortcuts, leading to wrong diagnosis and treatment.

Sources for misdiagnosis

The Galilean sciences and the modern scientific medicine have essentially focused their attention to the so-called physical world. However this did not sprang from a free epistemological reflection but, rather, from a political compromise with Inquisition, preventing the newborn science to deal with the soul (that is, psyche and consciousness), as emphasized by Galileo himself (*Dialogo sulle due Nuove Scienze, Giorno 3°, Corollario 3°*; see Facco and Cima[8], for further details). Therefore, science has drastically (and prejudicially) separated the observer from the observed phenomenon, while medicine has taken into account only the body, the Descartès *earthen machine*, leaving consciousness and psyche to religion and philosophy for centuries. As a result, the scientific medicine has focused its attention on organic components of diseases in a ruling mechanistic and reductionistic paradigm, skipping both functional, psychological and psychosomatic components: this is the main reason for the modern scientific medicine being very powerful in managing organic diseases and much below the expectations in understanding those looking *sine materia*, with the implicit inclination to consider them *a priori* as epiphenomena of often ill-defined psychiatric disorders.

Even the concept of disease and its diagnosis is someway a conventional fact, since its definition depends on both biological, psychosocial and cultural components[9]. The whole of the above mentioned facts imply the risk of misunderstanding the nature of several syndromes, leading to take a functional disorder for an organic one or a non-disorder for disorder[10]. There is a still misunder-

stood, ill-defined group of syndromes named Medically Unexplained Physical Symptoms (MUPS), including chronic fatigue syndrome, fibromyalgia, multiple chemical sensitivity (MCS), somatoform disorders, Gulf War Syndrome and other frequent patients complaints without a clear medical explanation[11-15]. It is far from being clear whether the separation of MUPS in different entities focusing on environmental (MCS), rheumatologic (fibromyalgia), toxic or post-viral (chronic fatigue syndrome), or psychological factors is appropriate or, rather, they may represent a group of still ill-defined related psychosomatic disorders approached from different perspectives. The frequent association of psychological or psychiatric components in the clinical picture of MUPS, such as somatoform and delusional disorders, anxiety and depression, suggests a relevant impact of cognitive, representational processes in symptom generation through a psycho-neurobiological interplay; this has led to suggest the need for a more holistic, psychosomatic approach in order to better understand the complex relationship mind-body-environment, improve the doctor-patient relationship and a patient's more active coping with the disorder[13,16-18].

The same is for chronic pain, where the conventional approach focused on organic components and their pharmacological or interventional manipulation, contradicts the very definition of pain and may lead to misdiagnosis and wrong treatments. Notably, the international Association for the Study of Pain (IASP) has wisely defined pain as a psychosomatic experience involving sensory and emotional experience, associated with actual or potential tissue damage, or described in terms of such damage[19]. This definition avoids tying pain to nociceptive pathways only, and clearly shows that its nature is essentially a matter of experience. Without experience there is no pain, while the experience of disease, pain and received treatment influence to each other and are deeply affected by psychological, social and cultural factors, where pain intensity, despite essential, is far from being the only target of assessment and treatment[20].

The above mentioned factors explain why chronic pain therapy remains in many cases elusive and there is no clear, shared agreement of how managing it effectively: as emphasized by Loeser[21], pain management is a chaotic component, confusing patients, health care providers, and payers. Its management would benefit from the approach of narrative medicine, which could improve the patient-doctor relationship, the capability of properly understanding the patient, and, thus, pain management[22-24]. Perhaps, the Voltairès aphorism *"Doctors pour drugs, of which they know little, for diseases of which they know less, into patients of whom they know nothing"* (quoted by Loeser [21]) remains topical.

In short, chronic pain misdiagnosis depends on two main factors:

a) *a priori* inclination to consider it as a symptom of organic diseases, leading to seek for structural causes only, while underscoring the functional components of patient's suffering;
b) considering only the most common and standard nosographic pictures (attaching the above mentioned labels to patient's symptoms, mainly relying on radiological findings). For example, it is widely accepted that severe neck pain may be caused by muscle contracture (e.g., torticollis), while such a cause is less commonly admitted for pain in the leg, where the attention is usually focused towards possible disc herniation or other vertebral abnormalities. This stance could be conceivable if the sciatic nerve would be the only possible source of leg pain, but clearly it is not the case: therefore it unwittingly turns into a shortcut or prejudice, reflecting the *Occam Razor* rule (see farther). Myofascial origin of pain is even less considered in abdominal or pelvic painful disorders, where patients with no structural detectable diseases are too often considered as affected by psychiatric disorders yet.

The above mentioned shortcuts introduce a crucial bias of epistemological nature in the differential diagnosis of pain, the so-called rule of *Occam Razor*, or *Rule of Thrift*: when a phenomenon may depend on different factors, one chooses (often unwittingly) the simplest (the most evident or the preferred one), skipping the others. The ruling business management of hospitals also favors this behavior in the illusion of saving time and money, but it can increase costs due to prescription of useless expensive investigative techniques and wrong treatments, instead. This can routinely be observed in patients with MP in the back and lower limb associated to CT or MR finding of an (asymptomatic) herniated disk, where the (wrong) diagnosis of sciatica leads to ineffective interventional treatments of the disc (epidural block or surgery) and/or long term use of analgesic drugs, including opioids and antiepileptics with their adverse effects.

A correct differential diagnosis calls for checking the presence and role of both myofascial components and coexistent structural abnormalities, in order to assess their relative weight and tell cause from coincidence: only this approach can avoid useless and disappointing invasive treatments with their possible iatrogenic adverse effects. It also may help understanding the nature of recurrent pain, which can, a), result from new myofascial components following a correctly indicated surgery or, b), persistent MP following the useless operation of a coincident lesion.

Pseudoradicular pain: pathophysiology and clinical pictures

Pain is probably the most common complaint and one of the major causes leading to seek for doctors' help. MP, on the other hand, is a complex functional phenomenon causing many different painful clinical pictures, which may simulate other diseases. Here, only a few essential elements of its pathophysiology and main clinical syndromes mimicking radicular pain will be shortly analyzed (for further details see[25,26].

MP is generated by small areas of irritability within taut bands of skeletal muscle or fascia, called trigger points (TrPs), which are locally tender and painful when active and yield a characteristic referred pain and autonomic phenomena to other areas of the body[25-29]; autonomic

symptoms include local vasoconstriction or vasodilation, lacrimation, local sweating, rhinitis, vertigo, tinnitus, visual disturbances, bowel and bladder dysfunction (such as interstitial cystitis[30]. For example, TrPs in sternocleidomastoid muscle may cause a frontotemporal headache radiated to the maxilla and associated to lacrimation, which might be taken for an atypical cluster headache.
MP may be deep, achy, sometimes burning, stinging and be associated do paresthesia or dysesthesia. It may be triggered, perpetuated or worsened by a variety of factors, including strain, sprain, posture, muscular tension, anxiety and psychological stress, ripetitive trauma or microtrauma, cold or heat, stress, concurrent diseases, fatigue, sedentary life, and a variety of organic disorders, including inflammatory and osteoarticular ones.
The diagnosis of MP relies solely on patient's symptoms and physical examination, including:

a) localized spontaneous pain and/or altered sensations;
b) a taut, palpable band in the involved muscle;
c) localised tenderness in a point along the taut band;
d) pain and altered sensations yielded by pressure on the TrPs;
e) limited range of motion and weakness of the involved muscle;
f) change in pain intensity following muscle stretching;
g) knowledge of features of the referred pain generated by each muscle, which gives rise to specific myofascial syndromes[31].

Muscles directly subjected to overload generate primary TrPs, while secondary TrPs may be generated mechanically or by reflex activity from a nociceptive focus in other somatic or visceral structures. MP and organic disorders may overlap to each other; skipping the former leads to an increased risk of inappropriate treatments and iatrogenic adverse effects, while a proper MP identification would allow for a simple and effective management[31]. Furthermore, misdiagnosis and unsuccessful treatments is so frustrating as to lead patients to consider their pain dark and intractable, a factor strongly increasing anxiety, stress and reactive depression, creating a vicious circle between pain and psychological distress. The latter may in turn lead the attending doctor to wrongly consider the patient as affected by psychiatric disorders and psychogenic pain: this is strongly disappointing to the patient, who feels himself misunderstood or even upset for the undeserved psychiatric label, with further frustration and worsening. Instead, pain and psychological trouble are the two facets of the same medal, calling for an holistic approach to the suffering patient, who should never be psychiatrized, but simply understood.

Pseudoradicular syndromes

Pain in the neck, shoulder, arm and low back pain caused by TrPs may often resemble a radiculopathy, with a wide range of pictures (see[25,26] for a comprehensive analysis). Thus, seeking for the actual cause of pain (radicular, myofascial, or both) is mandatory, when an herniated disc or other vertebral abnormalities are detected by radiological investigations. It is worth recalling once again that checking structural vertebral lesions is, of course, an essential step, but it is not enough and one is always to evaluate functional components of pain, especially MP.
The main myofascial syndromes resembling cervical radiculopathies are caused by TrPs in the pectoralis minor, scalenes and serratus anterior, while those mimicking lumbar radiculopathies are caused by TrPs in the gluteus minimus, tensor fasciae latae and piriformis. Besides them, most muscles of the limbs, alone or associated to those just mentioned, may cause more distal local and referred pain in the areas of the suspected radiculopathy.

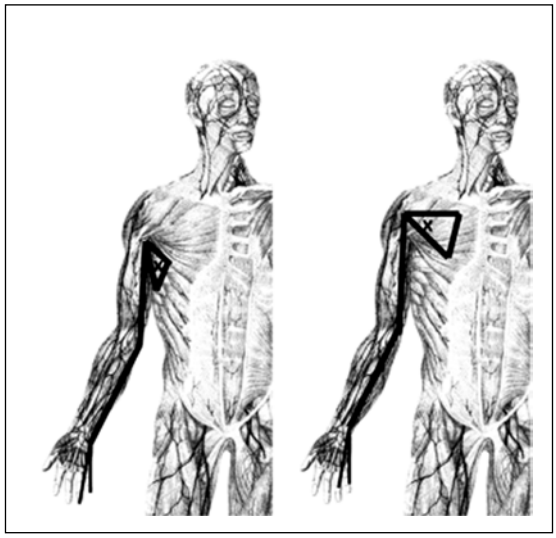

Figure 1. – Pseudoradicular C_7-C_8 pain resulting from trigger points in the pectoralis minor muscle (left) and serratus anterior (right) (X = trigger point).

Pseudoradicular C_7-C_8 syndrome

A shoulder pain radiating down the arm along the ulnar side to the IV and V finger, simulating a radiculopathy C_7-C_8, can be the result of TrPs in the pectoralis minor muscle (Fig. 1). It can also be associated to paresthesias due to a neurovascular syndrome due to compression of axillary artery and brachial plexus from the contracted pectoralis minor, close to its insertion to coracoid process during arm abduction. The pain may also be irradiated towards the precordial region; if so it may also be taken for a sign of heart disease. The serratus anterior causes a MP in the chest under the axilla (Fig. 1), which also may radiate down the ulnar part of the arm and bear dyspnoea, which increases during deep breaths. According to the history and predominant site and side of pain in individual patients (forearm or chest, left or right), it may be taken for pulmonary, cardiac or radicular disorders.

Pseudoradicular C_6-C_7 syndrome

MP in the radial part of the arm down to the I and II finger, simulating a C_6 radicular pain may be due to scalene syndrome a (Fig. 2). Likewise the pectoralis minor syndrome, paresthesias may be also present, when the con-

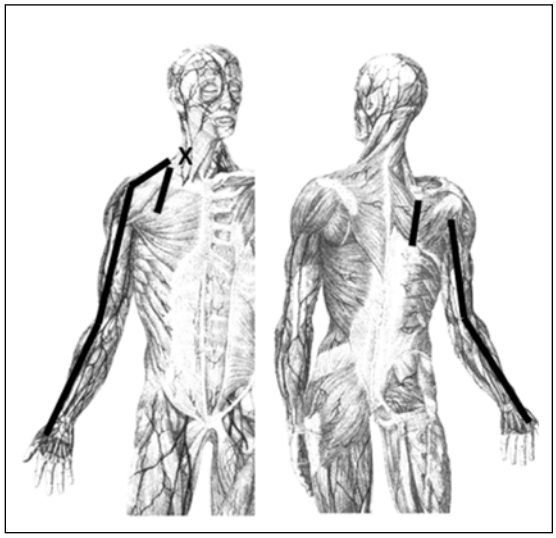

Figure 2. – Pain in the arm simulating simulating a C_6 radiculopathy due to trigger points in the scalene muscles (X = trigger-point).

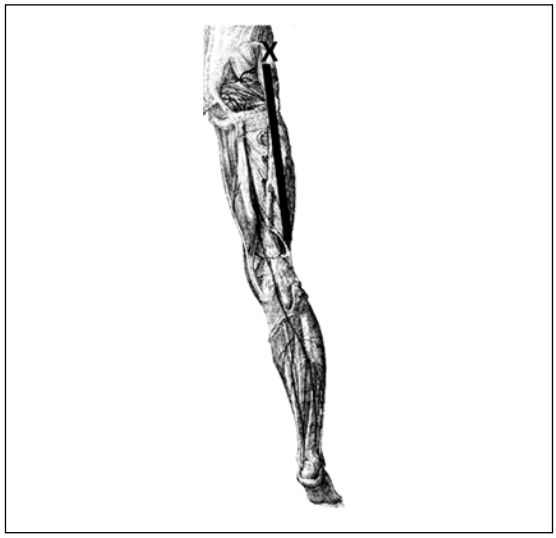

Figure 3. – Pain in the lateral aspect of thigh due to trigger points in tensor fasciae latae (X = trigger point).

tracted anterior and middle scalenes compress the fibers of the brachial plexus passing between them, or when spinal nerve C_5 and C_6 pass through the middle scalene. Paresthesias form the scalene muscles may also show a C_7-C_8 distribution, in relation to which spinal nerves are compressed in their passing through them.

Pseudoradicular L_4-L_5 syndrome

Patients with MP from TrPs in the tensor fasciae latae report pain in the hip and great trochanter radiating down to the knee in the lateral aspect of the thigh (Fig. 3), which can be taken for a L4-L5 radiculopahty, especially if the patient has a herniated disc at that level.

Pseudoradicular L_5-S_1 syndrome

MP from gluteus minimus radiates down the posterior or lateral part of the thigh and may reach the ankle, simulating a radiculopathy L_5-S_1 (Fig. 4). Pain may be so severe as to make hard both walking and resting in bed. The piriformis may also yield a pain radiated down the posterior aspect of the thigh, which can be associated to paresthesias when the sciatic nerve is compressed by the contracted muscle, thus mimicking a radiculopathy due to compression from herniated disk (Fig. 4). The paresthesia depends on the close anatomical relationship between the piriformis muscle and the sciatic nerve: in about 10-20% of cases the whole sciatic nerve or its peroneal component crosses the piriformis muscle and may be compressed by its contraction[32,33]. Pain from piriformis muscle may also give rise to a neurogenic component associated to MP, due to the sciatic nerve compression: if so, both pain and paresthesias radiate from the buttock down to the ankle and the foot.

The pseudoradicular syndromes may stem from TrPs of single above-mentioned mucles or, more frequently, from

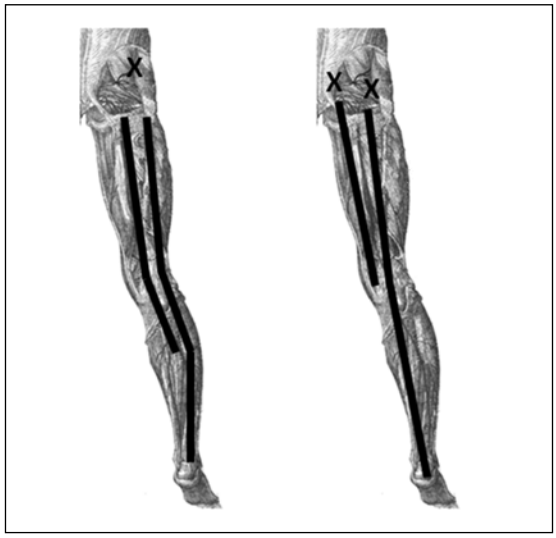

Figure 4. – Pseudoradicular L_5-S_1 syndrome caused by trigger points in the gluteus minimus (left) and piriformis (right) (x = trigger point).

a more complex involvement of several muscles with primary or secondary TrPs. They include shoulder and arm muscles (e.g., supraspinatus, infraspinatus, trapezius, biceps, forearm muscles), lumbar muscles (e.g., quadratus lomborum, ileo-psoas, obturator, gluteus maximus and medius), leg muscles (e.g., vastus lateralis, soleus, gastrocnemius, peroneal muscles, tibialis anterior). Therefore, MP may have a more or less complex origin, which calls for a thorough clinical examination of TrPs in relation

with reported symptoms, in order to properly assess individual patient's problem and the appropriate treatment.

In conclusion, the pseudoradicular syndromes of myofascial origin are to be accurately checked in all patients with pain radiating to the limbs; this is an inescapable aspect of differential diagnosis, especially when vertebral abnormalities are present on CT or MR, in order to avoid misdiagnosis and wrong treatments. Persistent pain is a complex functional phenomenon leading to suffering of the whole patient, never a simple symptom of an organic disease: the traditional inclination to skip subjectivity and psychological components, psychiatrizing patients in the absence of organic abnormalities is the plane consequence of physician's blindness to functional components. The latter leads to a threefold harmful consequence:

a) patient's distrust and worsening of overall conditions;
b) useless invasive treatments of coincident lesions, when present, with increased costs and adverse effects;
c) chronic abuse of drugs, the effects of which is often much below patient's and physician expectations.

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