SACROILIAC JOINT SYNDROME – DESCRIPTION OF PAIN ETIOLOGY

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Abstract

Numerous clinical studies have supported the thesis that sacroiliac (SI) joints constitute one of the causes of spinal pain radiating to the lower limb. The pathology of SI joint has been variously defined. The majority of definitions refer to the joint structure as the potential source of pain.As far as the etiology of SI joint dysfunction is concerned, it has not been disambiguated yet.Among the main causative factors, injuries and strains of the structures surrounding the joint are noted.Joint pathology usually manifests itself by pain occurring within the area of the joint.The causes of pain may be divided into two categories: intra-articular and extra-articular.Pain caused by the SI joint may be nociceptive or neural in nature, whereaspain pattern characteristic of the joint correlates with its innervation (S2 dorsal rami) and is consistent with the localisation of radicular pain to a large extent.

Keywords: Sacroiliac joint, pain pattern, pathomechanism, lumbosacral spine pain

Clinical studiesconfirm the thesisindicatingagainthe importance of thesacroiliac joints (SI) asone of the causesof back pain, proving that thisjointdysfunctioncancause symptomssimilar tosciatica[1,2]. According to variousauthors,the SIjointscan causediscomfort andin the case of16% -30% of patients with painlumbosacralspine[3,4]. Increasingly,researchers aredealing with issues ofpainepisodeLSwith radiationto the lower limbstate that themajority of respondentsare patients withradicularcomponentandpseudo radicular. Dysfunction of thevarious structuresmay overlapand togethercause symptomsin specific regions ofthe spine, andevenradiationin the same area [5].

In the terminologyof pain syndromes, whichthe source is sacroiliac joint following terms are used: SIjointdysfunction, SIjointsyndrome, SIjointblockage, inflammation of theSIjoint, SIjoint pain[6]. It is understoodthat the termsacroiliac jointpain,isthe presence ofpain in thejoint,whicharethe direct cause ofthe structure ofthe joint,while

theSIjointdysfunctionisincorrect positionormovement of thejoint structures, which may, but not need causepain[6].

Jointdysfunctionis definedas a state ofmechanical changes, characterized by the deviation fromthe expectednorm(the increase or decrease) and the occurrence ofabnormal movementswithin the joint[7]. Blockingorlockingjoint is calleddysfunctionin a joint withlimitedor excessivemobility ofmotion segment[8].

Diagnostic criteriadysfunctionsacroiliac jointswere developedby theInternational AssociationSociety fortheStudyof Pain(IASP) in 1994[9]. IASPdiagnostic criteria:

1. Presence ofpainaroundthe sacroiliac joint.
2. Pain inprovocationtest.
3. Intraarticularinjectionofanalgesic drugwhich will reduceorabolishpain[3,6].

The etiology of the pathology of the sacroiliac joint is still not entirely clear. There are many factors involved in the formation within the joint dysfunction. As the main source of pathology sacroiliac joint show:

1. injuries - 44% of cases (motorcycle accidents, fall on the buttocks)
2. multiple overloading the structures surrounding joint - 21% of the cases: (lifting the slope positions torsional overload associated with pregnancy),
3. unknown factor - 35% of cases [1,10]

Direct cause of a pain around the sacroiliac joint, and in accordance with the characteristic pattern for joint pain can be divided into:

1. Intra-articular (osteoarthritis, inflammation)
2. extra- articular (change in tension of the ligaments, myofascial pain)

Joint pain originating from SI may be of nociceptive or neurogenic. Nociceptive pain is produced by irritation of pain receptors in the joint or surrounding tissues, and as a result of irritation of neurogenic nerve endings within the spinal nerve [11]. Character nociceptive pain may have its origin in the structure both inside and outside the joint [12,13], and neurogenic pain in outside joint [14].

Sacroiliac innervated with dorsal branches of spinal nerves L4-S3, with the largest share of area S1-S2 [1,15,16]. This area is also a characteristic innervation of the sciatic nerve (L4-S3), hence pathology within the joint is considered as the main cause of pain pseudo radicular (sciatica like syndrome). Pain associated with a pond SI may be transferred i.e. nature of pain may be felt at a location remote from the original source of the pain. The causes of the phenomenon described by the theory of convergence, whose inventors show that the afferent impulses from different regions converge in the same second order neuron in the central nervous system. The brain may not be able to differentiate between pain impulses transported the same way neural and having the same sensory neurons, and from various sources [17]. This can cause pain projection to the corresponding regions of the body of convergent innervation [18], in the case of the sacroiliac joint will be pain along the lower limb, hence the problems in differentiating the pain of the pain of a root. In addition, histological analysis of the bundles of nerve innervating the pond SI shows the presence of myelinated fibers and without the myelin sheath [12], indicating that both the sensory stimuli and pain can be transported from the sacroiliac joint [19]. Studies of sensory neurons within the intervertebral disc SIJ and demonstrate an increased pain sensitivity sacroiliac joints [16]. This may suggest that the pain of the joint will be indicated by the patient as more severe, and the situation surrounding the pain of both the patient give the sacroiliac joint as dominant.

Intra-articular pathomechnism of pain

Among the factors affecting the occurrence of pain of intra-articular origin from increasing of mutual compression load on joint structure and inflammation are noted.Clinical studies have pointed to the dependence of lumbar spine stiffness and the SI joint.In patients after the surgical treatment of **disc** herniation with lumbar spine fusion, **the** hypermobility of

SIJ and **the increase in** compression load on joint structure **have** been observed. Load within the joint depended on the spinal area, which had been surgically immobilised [20].Another factor that may cause mechanical strain is anatomic shortening of the lower limb.The shortening may result in the increased friction within the joint, which may lead to its pathology and pain**, p**articularly that subchondral structure of SIJ **shows** great sensitivity to compressive forces [1].

The importance of the inflammatory factor, in turn, has been proven by immunohistochemical studies confirming the existence of nociceptors in the superficiallayers ofsacrum cartilage.The receptors react to inflammatory factors (i.e. substance P and CGRP protein), which shows that as the inflammation is initiated, SIJ structures may cause pain [13].Suri proved that degenerative joint changes may increase nociceptor expression in cartilage [21].Moreover, it has been noted that synovial fluid may occur beyond the joint area and, if it contains substance P, it may cause nerve irritation within the spinal area L4-S2 resulting in pain radiation into the lower limb [12,19].Some authors claim that nociceptors are present also at the surface of both the sacroiliac and interosseous ligament [15,22].If the inflammatory fluid finds itself beyond the area of the joint, pain receptors in the surrounding ligaments may be activated, which will become the direct cause of pain within the joint [12,19].

Extra-articular pathomechnism of pain

Among the extra-articular factors the ones the most frequently numbered are changes in ligament tension, inflammation ofthe ligaments and articular capsule damage [1,20,23]. Among the factors outside of the joint, usually lists the voltage changes or damage to the ligaments of the joint capsule [1,20,23]. One of the factors affecting the change in static structures of the sacroiliac joint is the period of pregnancy and childbirth. Anteversion of the sacrum during pregnancy with hormonal changes can lead to changes in mobility in the sacroiliac joints, the over-compression and shear forces [24,25]. The release of female hormones that enable relaxation of the body tissues, especially the pelvic ligament increases the range of motion and instability of the joints SI [1,26]. Irritation of the ligaments are stabilizing the sacrum: ilio-lumbar ligament, sacroiliac, cross-tumors [27]. Static disorders of the joints AI is considered to be one of the main causes of pain in the lumbosacral during pregnancy and after birth [1,6,26].

According to Pool-Goudzwaard et al. improper tension in the area of the iliolumbar ligament may lead to the limitation of the mobility of the SI joint in the sagittal plane, especially during nutation [23]. The term nutation describes the anterior-inferior motion of the sacrum against the ilium that occurs during gait. Limited nutation increases the pressure on the posterior side of the sacrum and the compression of joints [28].How the iliolumbar ligament influences the mobility of the SIJ depend greatly on the position of the fifth lumbar vertebra.Side bending and twisting of the lumbar spine limit the mobility of the SIJ and increase the tension of the ligament at the side of the bending or at both sides during twisting.Hence, the tension is transferred to other ligaments and may result, in consequence, in pain caused by the ligaments themselves and their insertions [23].The said pain may be referred pain, as many structures in this area have innervations convergent (the same level of the spinal cord) with the innervations of the iliolumbar ligament. For this reason, according to sensory neuron convergence, pain impulses may be transferred to these structures [29].Iliolumbar ligament irritation may cause pain in the area of the lumbosacral spine, as well as refer pain to the trochantericregion, groin and medial side of the thigh on the same side [30].

Anatomical and clinical studies have shown that long posterior sacroiliac ligament plays important role in pseudoradicular pain generation in the area of buttocks.The correlation between the said ligament and lateral branches of the dorsal sacral rami of S2

(middle cluneal nerve), which may lead to neuropathy and result in pain in the given area, has been observed [31,32].The erectors spinae aponeurosis, the gluteal aponeurosis and deep layer fascial together with the medial part of the sacroiliac ligament create a tunnel for the middle cluneal nerve.Changes in the tension in both gluteus maximus and gluteus medius muscle (caused by fall or injury) or erectors spinae are transferred to the ligament and cause the pressure of these structures on the nerve [28].The pressure on the middle cluneal nerve leads to neuropathy and pain below the posterior superior iliac spine [1,4,14].

Conclusion:

The pathology ofthe sacroiliac jointis consideredas the main causeof non-specificback pain(sciatica likesyndrome). A great dealof convergence betweenSIJsyndromeandsciaticasyndromemakes thediagnosisanddifferentiationof these twodisease entitiesbecomes verydifficult.Therefore, itbecomesimportantto knowthe exactpathomechanism, etiology andcausespainfor bothdysfunctions. A broadandwell-establishedknowledgein this areawould allow forclarification ofa list of criteriadifferentiating. Henceseemreasonablefurther research andthe advancement of knowledgein this field.

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