Anatomic bases of medical, radiological and surgical techniques

Anatomic basis of chronic groin pain with special reference to sports hernia

K. Akita1, S. Niga2, Y. Yamato3, T. Muneta4 and T. Sato1

1 Department of Anatomy, 4 Department of Orthopedic Surgery, School of Medicine, Tokyo Medical and Dental University, Yushima 1-5-45, Bunkyo-ku, Tokyo 113-8519, Japan
2 Department of Orthopedic Surgery and Sports Medicine, Kawaguchi Kogyo General Hospital, Aoki 15-18-1, Kawaguchi, Saitama 332-0031, Japan
3 Department of Surgery, Kawaguchi Kogyo General Hospital, Aoki 15-18-1, Kawaguchi, Saitama 332-0031, Japan

Received February 12, 1998/Accepted in final form July 22, 1998

Key words: Ilioinguinal nerve – Genitofemoral nerve – Sports hernia – Human gross anatomy – Clinical anatomy

Correspondence to: K. Akita, e-mail: k.akita.ana2@med.tmd.ac.jp

Abstract

Chronic pain on the ventral surface of the scrotum and the proximal ventro-medial surface of the thigh especially in athletes has been diagnosed in various ways; recently, in Europe the concept of "sports hernia" has been advocated. However, since few reports discuss the detailed course of the nerves in association with the pain, we examined the cutaneous branches in the inguinal region in 54 halves of 27 adult male cadavers. From our results, in addition to the cutaneous branches from the ilioinguinal n. (in 49 of 54: 90.7%), cutaneous branches originating from the genital branches of the genitofemoral nerve were found in the inguinal region in 19 of 54 halves (35.2%). In 7 cases (in 7 of 54: 13.0%) the genital branch and the ilioinguinal nerve united in the inguinal canal. In 6 cases the genital branch pierced the inguinal lig. to enter the inguinal canal, and in three cases the genital branch pierced the border between the ligament and the aponeurosis of the obliquus externus m. to be distributed to the inguinal region. Therefore, the courses of the genital branches vary considerably, and may have a very important role in chronic groin pain produced by groin hernia. In addition, entrapment by the ligament may be a reasonable candidate for the cause of chronic groin pain.

Chronic pain of the scrotal region and proximal ventro-medial thigh region, especially in athletes, has been diagnosed in various ways. Ekberg et al. [7] found occult inguinal hernia on surgical exploration in some patients with groin pain of uncertain etiology, and reported that their symptoms were improved by surgical repair of the hernia. Subsequently, the concept of "sports hernia" has been advocated mainly in Europe [10, 14, 23], but the etiology of the chronic pain is still unclear. Hackney [10] reported pain in the skin covering the adductor m., the scrotum and testicle in patients diagnosed as having sports hernia. Niga and Yamato [18] reported similar symptoms on 69 sides of 43 patients (40 males and three females) who were suspected of having sports hernia and successfully treated by reinforcement of the inguinal wall. The site was predominantly the proximal medial thigh region (76%), followed by the inguinal canal region (74%), the periscrotal region (42%), the proximal ventral thigh region (21%), and the lower abdominal region (9%). Fig. 1 summarizes the areas of spontaneous pain which were suspected in our previous study [18] to be due to sports hernia, and shows the cutaneous branch distribution of the areas. However, few have reported the detailed courses of the nerves in association with the pain.
Fig. 1
Right: Diagram of areas of spontaneous pain in 69 sides of 40 male and three female patients who were suspected of having sports hernia (after Niga and Yamato [16]). Left: The distribution of the cutaneous branches of the border nerves to the area of spontaneous pain in 54 pelvic halves of 27 male cadavers of the present study. 1, cutaneous branches of the iliohypogastric n. 2, ilioinguinal n. 3, union of the ilioinguinal and genital branch of the genitofemoral n. 4, genital branch of the genitofemoral n. which passes through the superficial inguinal ring. 5, the branch piercing the inguinal ligament or the border between the ligament and the aponeurosis of the external oblique m. 6, femoral branch of the genitofemoral n.

The descriptive anatomy of the nerves which supply the skin of the border between the abdomen and thigh is well-known. These "Grenznerven", so termed by Ruge [21] or "border nerves" as translated by Bardeen [4] consist of three nerves: the iliohypogastric, the ilioinguinal and the genitofemoral. The origin, course and distribution of the border nerves are very variable [1, 3, 4, 11, 15, 17, 21, 22]. Morikawa [17] pointed out that only 37% of the cases investigated were found to have the typical pattern as seen in most textbooks. Salama et al. [22] mentioned that the genital branch of the genitofemoral n. displays the features reported in classical anatomic descriptions in 18/25 dissections. These reports suggest the possibilities of varieties of syndromes due to nerve suppression by sports hernia. We studied the course and distribution of the border nerves in males with special reference to the relationships between the cutaneous branches of the border nerves and the inguinal canal, since these symptoms are predominantly found in males. The present study shows that the courses of the ilioinguinal n. and the genital branch of the genitofemoral n. are very variable, and the anatomic variation of these nerves should be taken into account in the examination and treatment of chronic groin pain. In addition, the nerves and their branches may be the most affected by groin hernia, and entrapment of a branch may be a reasonable candidate for the cause of chronic groin pain.

Material and Methods

Fifty-four pelvic halves of 27 male cadavers varying in age from 55 to 93 years (mean ± S.D., 78.3 ± 10.2) were carefully examined. The cadavers examined had been fixed in 10% formalin and preserved in 30% alcohol in all the specimens 24 presacral vertebrae (7 cervical, 12 thoracic, 5 lumbar) were found. Investigations were carried out as follows: 1) After removal of the skin, the cutaneous branches distributing to the inguinal region and the proximal thigh region were carefully exposed. 2) The inguinal canal was opened by an oblique incision to the aponeurosis of the external oblique m., and the nerve branches on the outer surfaces of the internal oblique m. and the spermatic cord were examined. 3) The course of these nerve branches was followed proximally, and their branches were identified. The nerves were identified chiefly according to Kasai [11]. The border nerves consist of three nerves: the iliohypogastric, ilioinguinal and