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Mini Review

Human Body Joint's Contractures in the Mirror of the History

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Abstract

Joints' contractures as a complication of various diseases, may follow neurological, rheumatic, and metabolic or genetic disorders. Deformity around the articulations aggravates the existed impairment and cause functional disability that worsen the burden on the patient. The article surveys the history of the contractures of the body limbs. During the last centuries, it seems that proper attempts to prevent this complication, failed.

Keywords: Contractures; Joints; Stiffness; Ankylosis; History

Introduction

Contracture is defined as shortening of the muscle resulting in an inability of the muscle to relax normally [1]. The consequences of this condition can be significant for activities of daily living as well as comfort and quality of life [2]. The frequency of contractures of joints, stiffness, ankylosis, both large and small, in patients who suffer from diseases of the central nervous system, as well as from metabolic, genetic or rheumatic diseases, is so high [3], that a significant part of physicians refers to them as a decreed fate. This disability worsens the functional limitation that initially stems from the disease which clearly enhanced the development of the contractures. There is no doubt that the same disability, which beyond the limitation of movement it causes, also creates an aesthetic defect in the pattern of the involved body and regularly disturbs the disabled people themselves, their families and the doctors who treat them. Those doctors who are exposed and required more than the others to deal with contractures phenomenon, usually come from the fields of family medicine, rehabilitation medicine, rheumatology, geriatrics, pediatrics, neurology, neurosurgery, pain medicine and orthopedics. Cramp develops when flexible elastic tissue such as skin, muscles, tendons or ligaments, turns into hard fibrous tissue (fibrosis). In this case, the range of motion in the involved joints is reduced, which severely impairs the function of the organ and sometimes even causes pain at the site of the damage [4,5]. The professional literature that deals with the various aspects of the same phenomenon is rich, but a scan of journals by Israeli authors on the PUBMED website found only a few articles (the list of articles is kept by the authors of this article). In the same articles, joint swellings that appeared in the context of diabetes [6], congenital diseases, central nervous system diseases [7,8], skeletal and joint diseases, rare skin diseases [9], and others, were described.

Contractures Along the History

According to the reviews that deal with the history of this phenomenon, at least one person was also denominated by his disability, is Herman "Contractus", or Herman von Reichenau [10]. He was born in 1013 with deformities that were visible (cerebral palsy?) and his parents, who belonged to a German noble family, transferer him to a monastery on Reichenau Island in Lake Konstanz for treatment and education. As he grew up, the nuns who cared for him noticed his extraordinary intellectual skills and slowly he advanced in the religious hierarchy and became the abbot. During his life he wrote books in the fields of philosophy, history, mathematics, music and theology, until he passed away in 1054 at the age of 41. The phenomenon of tendon shortening that causes cramps has been known to medicine for many years. Already in 1685, a Dutch surgeon named Isacius Minnius performed a tenotomy (cutting the tendons) in order to correct a phenomenon described as torticollis, which means a distortion in the neck position [11]. In 1840, the French surgeon Jules Rene' Guerin (1801 - 1886) performed tenoto-

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mies in the muscles that connect to the neck of the femur [12]. Robert Chesher (or Chessher) (1750 - 1831), a leading English orthopedic doctor was known as the one who performed autopsies on executed criminals, in order to check for various deformities and morbid findings in the skeletal system [13]. He described and perhaps even developed a device for releasing joint contractures. The French doctor-anatomist Jean-Baptiste Marc Bourgery (1797 - 1849), published a series of eight volumes of anatomy books, illustrated by the artist Nicolas Henri Jacob and among them, a dissection image of a thigh tendon which caused a cramp (14). The German surgeon- author-poet Richard von Volkmann (1830–1889) described in 1881 a claw-like deformity that was formed in the wrist flexion position and which was caused by ischemia. A consequence of increased pressure probably caused by a tourniquet or by a cast [15]. When doctors began to treat and rehabilitate people affected by poliomyelitis and cerebral palsy, surgical methods, as well as physical ones, to repair tendon contractures, were developed along the years [16]. A different type of cramp is named after the French surgeon Baron Guillaume Dupuytren, who lived between 1777 and 1835 and served as a military surgeon who treated Napoleon's hemorrhoids [17].

He became famous after describing in 1831 a phenomenon of shortening in the tendons of the muscles that flex the fingers of the hands, which is named after him, as published in the well-known scientific journal Lancet in 1834. This callus develops gradually and is caused by hardening of the palmar flexor tendons Dupuytren's syndrome, which may develop also in the toes, is named after Ledderhose (Ledderhose disease = plantar fibromatosis(· Georg Otto Ledderhose (1855 – 1925) was a German surgeon and pioneering traumatologist [18]. A relatively common contracture is the "trigger finger" and is the result of inflammation in the synovial sheath of the flexor tendon in the finger in the palm of the hand, which causes a permanent bend in the inter-roll joint involved and requires a short surgical intervention to correct the resulting deformity [19]. Among the congenital diseases that cause contractures in multiple joints, we mention arthrogryposis [20] as well as the club foot phenomenon [21].

Congenital finger contracture was first described by one of the fathers of orthopedics in England Richard Williams Tamplin (1814 - 1874) and was the brother-in-law of William John Little who first described the cerebral palsy syndrome [22]. It is also necessary to mention the French surgeon doctor JMM Lucas-Championniere (1843-1913) and advocated physical methods such as massage to treat contractions [23]. A permanent deformity due to a stable stiffness that usually forms around a large joint, may result from the growth of new bone tissue (periarticular new bone formation), often as a result of a severe injury to the brain or spinal cord [24,25,26]. This pathological accretion, which is called "ectopic bone", or "periarticular ossification", may cause ankylosis (irreversible stiffness) in the involved joint, a phenomenon that sometimes requires surgical intervention for the purpose of excision of the resulting bone and release of the adjacent tendons [27].

What Should we know About Contractures?

Tendons' contractures that cause deformity in one or more limbs, arises as a result of both a congenital problem and an illness, or as a result of injury. The main reason for its formation is damage to the central nervous system, such as cerebral palsy, a cerebro-vascular event, traumatic brain injury or damage to the spinal cord, but the contracture may also occur as a result of prolonged inflammation in the peripheral joints [28]. Rehabilitation medicine, which treats people with disabilities, either temporary or permanent, should provide an answer to all those who, for one reason or another, suffer from joints' and tendons' contractures.

The treatments for this complication require considerable professional knowledge and skill and can be carried out, both in hospitals and in the community, in physical therapy and occupational therapy institutions, using oral medication, injections of various substances or surgery. There is no doubt, that preventing the development of contractions in cases where there is a danger of their formation, is the ideal action required. Apparently, it will be a difficult task to achieve it. Also, it seemed that throughout history, the various doctors and therapists failed to do this. Among those actions that can prevent the appearance of cramps in patients who are prone to their formation, the first and foremost high frequency is physical and occupational therapy, as well as the installation of stabilizing splints around the joints that may be involved.

Author Statements

Conflict of Interest

The authors declare that they have no conflict of interest.

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References

1. Dijkstra JN, Boon E, Kruijt N, Brusse E, Rams S, Jungbluth H, et al. Muscle cramps and contractures: causes and treatment. Pract Neurol. 2023; 23: 23-34.

2. Dehail P, Gaudreault N, Zhou H, Cressot V, Martineau A, Kirouac-Laplante J, et al. Joint contractures and acquired deforming hypertonia in older people: Which determinants? Ann Phys Rehabil Med. 2019; 62: 435-441.

3. Fergusson D, Hutton B, Drodge A. The epidemiology of major joint contractures: a systematic review of the literature. Clin Orthop Relat Res. 2007; 456: 22-29.

4. Campbell TM, Dusdek N, Trudel G, Joint contractures. In: Frontera WR, Silver JK, Rizzo TD Jr, eds. Essential of physical medicine and rehabilitation. 4th ed. Philadelphia, PA: Elsevier 2019: chapter 127.

5. Miller RH, Azar FM, Throckmorton TW, Shoulder and elbow injuries. In: Azar FM, Beaty JH, eds. Campbell's operative orthopaedics. 14th ed. Philadelphia, PA: Elsevier. 2021: 46.

6. Yosipovitch G, Mukamel M, Karp M. Diabetic hand syndrome in juvenile diabetics. Harefuah. 1990; 119: 63-66.

7. Galasko CS. Incidence of orthopedic problems in children with muscle disease. Isr J Med Sci. 1977; 13: 165-176.

8. Gardner-Medwin D. Objectives in the management of Duchenne muscular dystrophy. Isr J Med Sci. 1977; 13: 229-234.

9. Silfen R, Yaffe B. Diffuse lichen sclerosis et atrophicus involving the palms. Harefuah. 2003; 142: 517-519.

10. Ohry A. People with disabilities before the days of modern rehabilitation medicine: did they pave the way? Disabil Rehabil. 2004; 26: 546-548.

11. Ohry A, El Masri WS. A forgotten 19th century surgeon: Richard Anthony Stafford (1797-1854), FRCS. Spinal Cord Ser Cases. 2017; 3: 17084.

12. Bick EM. Source book of orthopedics. Hafner publishing co. New York, London. 1968: 382.

13. Hurren ET. A disintegrating corpse: the science of extremities. In: Dissecting the Criminal Corpse, Staging Post-Execution Punishment in Early Modern England. Palgrave (McMillan) Historical Studies in the Criminal. London. 2016; 244-274.

14. Delécluze ÉJ. Des travaux anatomiques de M. le Docteur Bourgery. Paris: Revue de Paris. 1840: 208–222.

15. Volkmann R. Die ischämischen Muskellähmungen und Kontracturen. Centralblatt für Chirurgie. Leipzig. 1881; 801–803.

16. Kenny E. Infantile paralysis and cerebral diplegia. Angus & Robertson Ltd, Sydney, Australia. 1937; 55-58.

17. Maravic M, Landis P. Dupuytren's disease in France, 1831 to 2001, from description to economic burden. J Hand Surg Br. 2005; 30: 484-487.

18. Akdag O, Ylldiran G, Karamese M, Tosun Z, Dupuytren-like contracture of the foot: Ledderhose disease. Surg J (NY). 2016; 2: 102-104.

19. Cuccurullo SJ, Physical medicine and rehabilitation board review, 3rd edition. Demos Medical. 2015: 206-207.

20. Langston S, Chu A. Arthrogryposis Multiplex Congenita. Pediatr Ann. 2020; 49: 299-304.

21. Cailliet R. Foot and ankle pain, 3rd edition. FA Davis Company. Philadelphia. 1997: 113-118.

22. Tamplin RW. A Course of Lectures on the Nature and Treatment of Deformities. Br Med J. 1860; 1: 469-71.

23. Lucas-Championniere P. Sur une deformation particuliere des doigts propres a' l'arthritisme. J Mid Chir prat. 1885; 56: 485.

24. Ohry A, Shemesh Y, Rozin R. The problem of arthropathy and pathologic ossification in head and brain injured. Harefuah. 1978; 94: 430-432.

25. Zeilig G, Weingarden HP, Levy R, Peer I, Ohry A, Blumen N. Heterotopic ossification in Guillain-Barré syndrome: incidence and effects on functional outcome with long-term follow-up. Arch Phys Med Rehabil. 2006; 87: 92-95.

26. Tsur A, Sazbon L, Lotem M. Relationship between muscular tone, movement and periarticular new bone formation in post-coma-unaware (PC-U) patients. Brain Inj. 1996; 10: 259-262.

27. Salazar D, Golz A, Israel H, Marra G. Heterotopic ossification of the elbow treated with surgical resection: risk factors, bony ankylosis, and complications. Clin Orthop Relat Res. 2014; 472: 2269-2275.

28. Nuckolls GH, Kinnett K, Dayanidhi S, Domenighetti AA, Duong T, Hathout Y, et al. Conference report on contractures in musculoskeletal and neurological conditions. Muscle Nerve. 2020; 61: 740-744.