

Desmoid Fibromatosis in the Brachial Plexus Mimicking an Ulnar Nerve Entrapment

Emelie Styring^{1,*}, Marie Ahlström², Pehr Rissler³, Fredrik Mertens⁴, Kasim Abul-Kasim⁵, Lars B. Dahlin^{6,7}

¹Lund University, Skane University Hospital, Department of Orthopedics, 221 85 Lund, Sweden

²Lund University, Skane University Hospital, Department of Hematology, Oncology and Radiophysics, 221 85 Lund, Sweden

³Lund University, Skane University Hospital, Department of Clinical Sciences Lund, Pathology, 221 85 Lund, Sweden

⁴Lund University, Skane University Hospital, Division of clinical genetics, 221 85 Lund, Sweden

⁵Department of Radiology, Division of Neuroradiology, Lund University and Skane University hospital, 205 01 Malmö, Sweden

⁶Department of Translational Medicine – Hand Surgery, Lund University, 205 01 Malmö, Sweden

⁷Department of Hand Surgery, Skane university Hospital, 205 01 Malmö, Sweden

*Corresponding author: Emelie.styring@med.lu.se

Received January 14, 2019; Revised February 22, 2019; Accepted March 14, 2019

Abstract Introduction: Ulnar nerve entrapment is a common cause of sensory disturbance and weakness in the upper extremity, especially in patients with diabetes mellitus. However, if the symptoms are atypical and the patient has severe pain other differential diagnoses should be considered. **Case report:** A 37-year-old man with type 1 diabetes mellitus was referred to the hand surgery unit due to increasing pain, numbness and weakness in his right arm developing over more than one year. An ulnar nerve neurography was inconclusive and the patient had a frozen shoulder on the right side. Due to the pain, the patient required high doses of opioids. At examination, the clinical presentation did not correspond to an ulnar nerve entrapment why other causes were considered. A chest X-ray revealed a lesion in the apical part of the right lung. Consecutive CT scan, MRI and fine and core needle biopsies led to the diagnosis of a desmoid tumor. Surgery was deemed to be too mutilating and treatment was initiated with doxorubicin. Due to tumor and symptom progression the therapy was changed to PegIntron, then antiestrogen and NSAID and finally tyrosine kinase inhibitor (sorafenib) resulting in tumor shrinkage. **Conclusion:** Although nerve entrapment is a common cause of discomfort and impaired function in the upper extremities different etiologies, including various tumors, have to be considered when the symptoms are atypical and if the patient has severe pain. For these patients, the diagnostic work-up has to be broadened.

Keywords: ulnar entrapment, desmoid, radiating pain, paresthesia

Cite This Article: Emelie Styring, Marie Ahlström, Pehr Rissler, Fredrik Mertens, Kasim Abul-Kasim, and Lars B. Dahlin, “Desmoid Fibromatosis in the Brachial Plexus Mimicking an Ulnar Nerve Entrapment.” *American Journal of Medical Case Reports*, vol. 7, no. 3 (2019): 36-40. doi: 10.12691/ajmcr-7-3-2.

1. Introduction

Ulnar nerve entrapment, with an approximate incidence of 20.9/100 000 inhabitants and year [1], is a common condition with paresthesia, sensory disturbance and muscle weakness in the sensory area and muscles innervated by the ulnar nerve [2]. Such symptoms may be even more common in patients with diabetes mellitus, which may confer an increased susceptibility to compression on the nerve [3].

Depending on the level of entrapment, the symptomatology varies concerning the ulnar nerve and often a neurography is performed to support the diagnosis of an ulnar nerve entrapment as well as an indication of the prognosis of surgery [2]. However, severe pain, requiring opioids, is usually not a typical finding in an ulnar nerve entrapment.

Among the differential diagnoses to ulnar nerve entrapment are conditions in the cervical spine, such as disc herniation affecting C8, medial epicondylitis, polyneuropathy of various causes, such as alcohol or diabetes mellitus, hypothyroidism, infections, apical tumors in the lung (i.e. Pancoast tumor), various tumors [4,5,6,7] or metastasis (e.g. from breast cancer) in the brachial plexus [8].

Soft tissue tumors in the extremity and trunk wall are common, most often they present as small (<5cm), subcutaneous tumors. The benign soft tissue tumors outnumber malignant soft tissue sarcomas by 200:1 [9]. However, among deep-seated and/or large tumors the risk of malignancy is much higher. The clinical presentation is most often indolent with little or no other symptoms than a lump. Due to proximity to blood vessels (risk of deep vein thrombosis) or nerves (pain due to compression and or infiltrative growth) the presentation may vary though. The diagnostic work-up is often challenging and requires a multidisciplinary approach.

2. Case Report

2.1. Clinical Presentation

A 37-year-old man with type 1 diabetes mellitus (no complications), since the age of 12 years, who was working with manual tasks, developed paresthesia and numbness in his right arm and hand, relieved by shaking the arm, during the spring of 2016, initially with a distribution along the ulnar nerve innervated area. He was diagnosed with a frozen shoulder on the ipsilateral side and treated with physiotherapy and several cortisone injections. Due to increasing paresthesia and numbness, with accumulating pain, he was referred to a neurography. There were signs of bilateral slightly reduced conduction velocity and reduced amplitude in the median nerve at wrist level. Furthermore, there was a lack of sensory nerve conduction (i.e. 0-response) in the right ulnar nerve, but with no signs of any local nerve compression at elbow level (inching technique). There were no signs of polyneuropathy in the lower extremity (i.e. sural nerve function normal and vibration and temperature thresholds normal). Meanwhile, the symptoms worsened, with persistent pain. The patient required high doses of opioids, i.e. 80 mg of oxycodone depot and gabapentin 300 mg twice daily. One of the authors (LD; hand surgeon) was contacted by a relative of the patient and booked the patient to the outpatient clinic.

At the clinical examination, the patient presented with an active and passive right shoulder flexion and abduction of 45° as well as a decreased external rotation. There was a slight asymmetry between the right and left trapezius muscles without impaired strength or palpable tumors. His right flexor carpi ulnaris muscle (FCU) seemed somewhat atrophic. He had a weaker strength in the muscles of flexor digitorum profundus to little finger (FDP 5), first dorsal interosseous muscle (IOD 1), and abductor digiti minimi [ADM; all of them M4- on the British Medical Research Council (BMRC) scale], as in cases with ulnar nerve entrapment. However, he was also weak (M4+) in other muscles, such as extensor pollicis longus (EPL), flexor pollicis longus (FPL) and FDP to index finger, but no other loss of functions related to the median and radial nerves. Measurement of sensation with Semmes-Weinstein monofilament showed normal sensation in little finger at right side (2.83), and all other fingers in both hands showed an impaired sensation to light touch (3.61). He felt no pain at percussion over the median, ulnar or radial nerves along the extremity (i.e. no Tinel's sign) or at the supra- and infraclavicular fossa on the right side. There were no increased symptoms on flexion of the elbow. Peripheral pulses were normal and no swelling or increased venous pattern in the extremity.

2.2. Diagnostic Imaging

Due to the clinical presentation of loss of function in muscles innervated by different nerves and the radiating pain, a planned EMG was requested sooner, and additional x-rays of the shoulder and chest were ordered. The x-ray of the chest revealed a suspected lesion in the apical part

of the lung (Figure 1). Therefore, a CT-scan (Figure 2 a-c) and a MRI (Figure 3) were performed, showing an 8 x 4.5 x 5 cm large mass located in right supraclavicular fossa with extension into thoracic aperture, upper mediastinum and into the lateral parts of neural foramen C6-C7 and C7-Th1. Brachial plexus upper and middle trunks passed through the mass, while the lower trunk was dorsally displaced at the lower border of the mass. The right vertebral artery passed also through the medial margin of the mass, while the common carotid artery was displaced medially. Right subclavian artery passed also through the anterior-lower part of the mass. On MRI, the mass showed low signal intensity on T1W-images, high signal intensity on T2W-images and exhibited strong homogeneous contrast enhancement.

The patient was discussed at a multidisciplinary treatment conference at the Lund sarcoma center and due to the highly infiltrative growth found on MRI, suspicion of a lymphoma or pheochromocytoma was initially raised. After a non-diagnostic fine needle biopsy, a repeated ultrasound-guided fine and core needle biopsy was made.

2.3. Histopathologic and Genetic Diagnostics

Core needle biopsy showed collagenous stroma containing fascicles of uniform fibroblasts without atypia and mitoses. The histologic features were consistent with desmoide type fibromatosis. Immunohistochemistry was focally positive for SMA and negative for desmin. B-catenin is usually positive but was in this case negative. To exclude low-grade fibromyxoid sarcoma, one of the major differential diagnosis, FISH regarding FUS (16p;11) was performed with no sign of translocation.

DNA was extracted from fresh tumor material, prepared for SNP array analysis, and analyzed using the Affymetrix Cytoscan HD array (Affymetrix, Santa Clara, CA, USA) as described (Walther et al., 2016). SNP array analysis disclosed two subclonal imbalances: loss of 6q11-q25 and gain of chromosome 20.

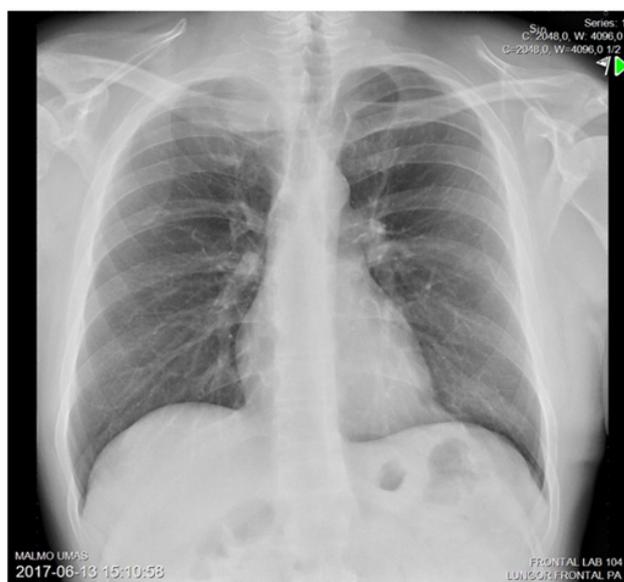


Figure 1. Conventional chest x-ray showing a mass in the apex of the right lung

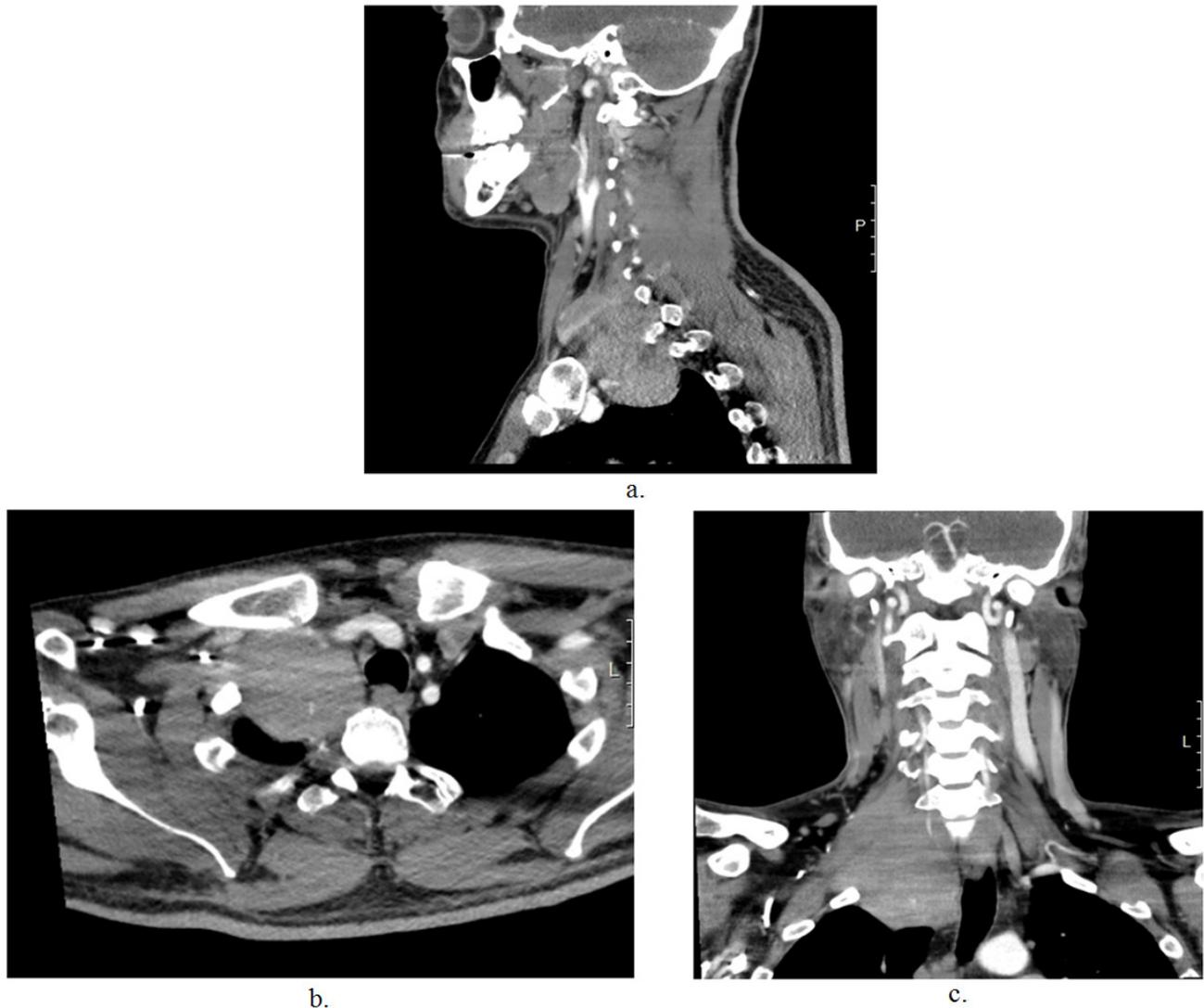


Figure 2. Chest CT scan showing the tumor affecting the right brachial plexus. A. Sagittal view. B. Transverse view. C. Coronal view

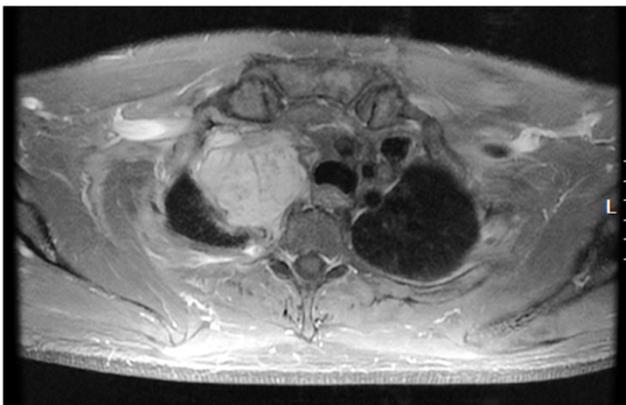


Figure 3. MRI scan of the tumor. Transverse view of T1 weighted fat saturated images with gadolinium contrast enhancement

2.4. Treatment and Outcome

Due to the severe symptomatology, the diagnosis of a desmoid tumor and the tumor location, surgery was deemed to be associated with too severe functional impairment in addition to a low chance of wide surgical margins. The pharmacological treatment with best reported objective response is anthracycline-containing

regimens. Therefore, the patient was treated with doxorubicin with a dosage of 75 mg/m^2 per cycle and G-CSF support. At evaluation after 3 cycles of doxorubicin, the patient had increased pain in his right hand, arm and shoulder. The follow up CT showed 2 cm increase of tumor size in mediastinum. The tumor now reaches down to the upper lobe bronchus compared with the previous exam where there was a 2 cm large lung parenchymal tissue separating the tumor from the upper lobe bronchus (Figure 4 a-b).

Therapy was changed to weekly PegIntron (interferon alfa-2b) subcutaneous injections. The dosage was 50 microgram/dose once weekly for 4 weeks, and thereafter 100 microgram/dose. After 4 weeks, the patient had less pain and improved hand motility. Also, the palpable tumor in the right fossa supraclavicularis was reduced in size. However, after four months, the intrathoracic component of the tumor progressed, and the treatment changed to antiestrogen (e.g. Toremifen) and NSAID. Due to persistent tumor growth the treatment was changed to a tyrosine kinase inhibitor (e.g. Nexavar). Thereafter the tumor has shrunk, and the pain begun to decrease. Still, throughout the entire period the patient has suffered from severe pain and the patient is currently treated with methadone, oxycodone and NSAID.

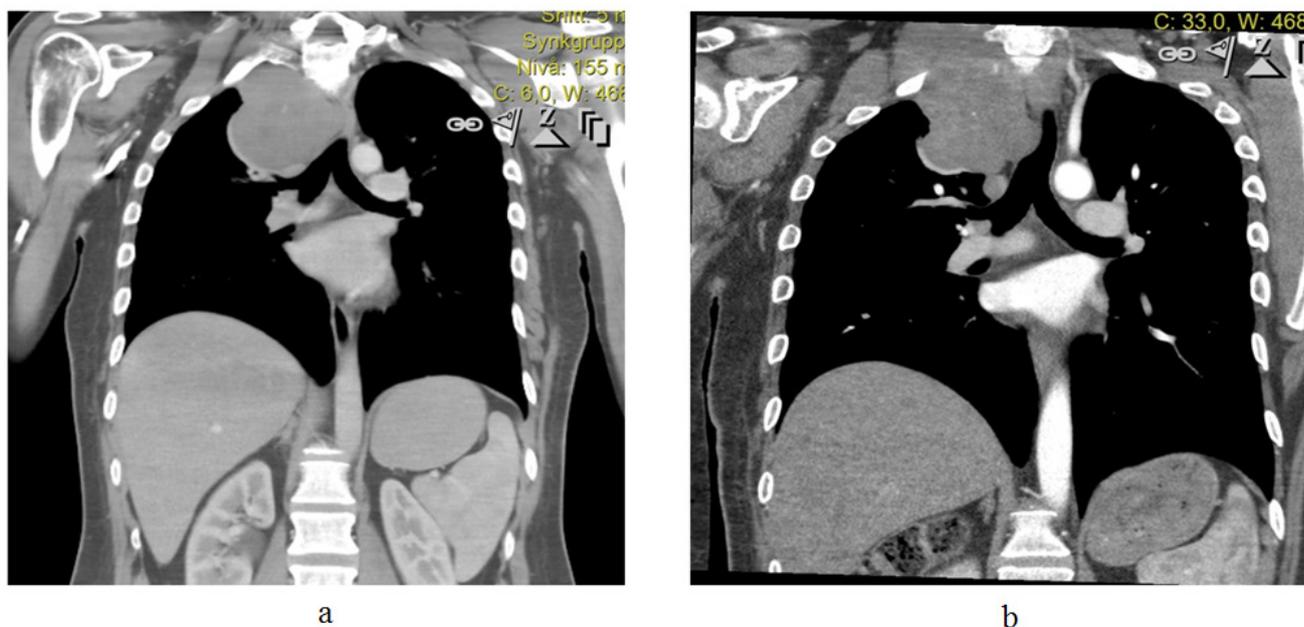


Figure 4. Chest CT scan showing the tumor after 3 cycles of doxorubicin. The tumor had increased 2 cm and reached the upper lobe bronchus. A + B. Coronal view

3. Discussion

This case highlights the importance of re-evaluating patients with progressive symptomatology from the peripheral nervous system (PNS) even if there are other concomitant diseases that may affect PNS, such as diabetes mellitus. A repeated and thorough clinical examination in the present case indicated affection of particularly the ulnar nerve, albeit without signs of entrapment. Also, some dysfunction of the median and radial nerve was found, indicating that mainly the lower trunk and partly middle trunk of the brachial plexus was affected. At first, there were no signs of subclavian artery or vein affection. The combination of symptoms suggested a more proximal engagement rather than a peripheral nerve entrapment. The symptoms were vague, but the severe and progressive pain was an important sign, since it can be due to a tumor affecting the nerves [4,10]. With a plain chest x-ray, the tumor was found, and the diagnostic process proceeded with an MRI.

A majority of tumors at this location are peripheral nerve sheath tumors, such as Schwannoma [11]. At MRI, many tumors, including Schwannomas, have a homogenous enhancement. Desmoid tumors do, however, usually exhibit some signal inhomogeneity due to its fibrous tissue content, especially on T2W-images with predominantly low signal. This is more evident following contrast administration, when desmoid tumors usually shows inhomogeneous enhancement [12]. The tumor in our case, resembled a Schwannoma rather than a desmoid tumor at MRI.

The combination of radiological, histopathological and genetic diagnostics rendered the diagnosis. Although the SNP array findings were not specific for any particular type of soft tissue tumor, both trisomy 20 and loss of material from chromosome 6 have been described as recurrent changes in desmoid-type fibromatosis [13,14]. Also, no characteristic aberrations for possible differential diagnoses were found.

Once the desmoid diagnosis was established different treatment alternatives were discussed. Due to the patient's severe symptoms, the "wait and see" approach was not an option. Further, surgery was deemed to lead to too severe functional impairment. The effects of radiotherapy are debated why it was not considered as first line of treatment [15]. As first line of treatment doxorubicin was administered [15,16], however it did not ease the symptoms. Instead, PegIntron (interferon alfa-2b) was administered with improved symptomatology and initial tumor shrinkage. After four months, the intrathoracic component of the tumor progressed, and the treatment was changed to anti-hormonal treatment (e.g. tamoxifen) and NSAID. However, the pain persisted, and the tumor grew further why a tyrosine kinase inhibitor (e.g. Nexavar), was given instead. The patient's symptoms improved, and the tumor has been shrinking since.

4. Conclusion

We conclude that patients with sensory disturbance and weakness in the upper extremities presenting in an atypical way need further evaluation and that a wider range of differential diagnoses should be considered. Especially when severe pain is present, different etiologies, including various tumors, should be considered and the diagnostic work-up broadened.

References

- [1] Mondelli M, Giannini F, Ballerini M, Ginanneschi F, Martorelli E. Incidence of ulnar neuropathy at the elbow in the province of Siena (Italy). *J Neurol Sci.* 2005; 234(1-2): 5-10.
- [2] Anker IZ, M. Andersson, G.A. Jacobsson, H. Dahlin, L.B. Outcome and predictors in simple decompression of ulnar nerve entrapment at the elbow. *Hand and Microsurgery.* 2018; 7(1): 24-32.

- [3] Thomsen NO, Mojaddidi M, Malik RA, Dahlin LB. Reduced myelinated nerve fibre and endoneurial capillary densities in the forearm of diabetic and non-diabetic patients with carpal tunnel syndrome. *Acta Neuropathol.* 2009; 118(6): 785-91.
- [4] Dahlin LB, Scherman P, Besjakov J, Lindberg E, Solomon DA, Horvai AE, et al. Intraneural glomus tumor of "uncertain malignant potential" and with BRAF mutation in the median nerve - an unusual case. *Clin Neuropathol.* 2017; 36(4): 164-70.
- [5] Wadhwa V, Salaria SN, Chhabra A. Granular cell tumor of the ulnar nerve: MR neurography characterization. *J Radiol Case Rep.* 2014; 8(6): 11-7.
- [6] Krisht KM, Karsy M, Shah LM, Schmidt MH, Dailey AT. Unusual brachial plexus lesion: Hematoma masquerading as a peripheral nerve sheath tumor. *Surg Neurol Int.* 2016; 7(Suppl 3): S64-6.
- [7] Benevello C, Sommacale D, Palladino E, Bildea A, Tres I, Volpin E. A rare case of malignant schwannoma of the brachial plexus. *World J Surg Proced.* 2013; 3(1): 1-3.
- [8] Assmus H, Antoniadis G, Bischoff C, Hoffmann R, Martini AK, Preissler P, et al. Cubital tunnel syndrome - a review and management guidelines. *Cent Eur Neurosurg.* 2011; 72(2): 90-8.
- [9] Rydholm A. Management of patients with soft-tissue tumors. Strategy developed at a regional oncology center. *Acta Orthop Scand Suppl.* 1983; 203: 13-77.
- [10] Orege J, Koech F, Ndiangui F, N.M. B, Mbaruku N. Desmoid Tumour of the Brachial Plexus. *Case Reports in Surgery.* 2013; 2013.
- [11] Go MH, Kim SH, Cho KH. Brachial plexus tumors in a consecutive series of twenty one patients. *J Korean Neurosurg Soc.* 2012; 52(2): 138-43.
- [12] Dinauer PA, Brixey CJ, Moncur JT, Fanburg-Smith JC, Murphey MD. Pathologic and MR imaging features of benign fibrous soft-tissue tumors in adults. *Radiographics: a review publication of the Radiological Society of North America, Inc.* 2007; 27(1): 173-87.
- [13] Mertens F, Willen H, Rydholm A, Brosjo O, Carlen B, Mitelman F, et al. Trisomy 20 is a primary chromosome aberration in desmoid tumors. *Int J Cancer.* 1995; 63(4): 527-9.
- [14] Crago AM, Chmielecki J, Rosenberg M, O'Connor R, Byrne C, Wilder FG, et al. Near universal detection of alterations in CTNNB1 and Wnt pathway regulators in desmoid-type fibromatosis by whole-exome sequencing and genomic analysis. *Genes Chromosomes Cancer.* 2015; 54(10): 606-15.
- [15] Penel N, Chibon F, Salas S. Adult desmoid tumors: biology, management and ongoing trials. *Curr Opin Oncol.* 2017; 29(4): 268-74.
- [16] Sivanesan E, Gitlin MC. Desmoid Tumors: A Review of the Literature and Pharmacologic Management. *J Pain Palliat Care Pharmacother.* 2016; 30(2): 99-105.



© The Author(s) 2019. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).