Segmental neurofibromatosis (SN) is a rare clinical subtype of the neurofibromatoses. The most recent literature reports only 150 documented cases. The prevalence ranges from 0.001% to 0.002%. The first reported cases of segmental neurofibromatosis were published in 1931 by Gannett and in 1956 by Crowe et al. SN became labeled neurofibromatosis type V and was defined as cutaneous-muscle and/or cutaneous-axillary involvement. Various classification systems have been proposed to classify segmental neurofibromatosis.

Clinical Presentation:

The clinical presentation of SN is fairly typical between patients. However, rare presentations have been reported in the literature. The largest case review of SN was done by Hager in 1997 – he examined the clinical presentation of 82 patients with biopsy proven SN. He found that the median age of onset was 28 years old and that the incidence was higher in women (58%). Out of the 82 patients, 100% had neurofibromas, 26% had axillary-tail macules, and 10% had axillary freckling. Most neurofibromas were localized, however, 5 patients had bilateral neurofibromas. Most patients had only a single dermatome affected. Interestingly, recent case reports have documented patients with SN present on multiple dermatomes. The cervical (38%), thoracic (40%), and lumbar (24%) dermatomes were the most commonly affected regions. Facial involvement is rare but has been reported on several occasions. Fortunately, only 21% of patients had any additional systemic involvement. The most common systemic complaints in this study were painful neurofibromas (7 patients) and pruritic neurofibromas (4 patients). Another clinical finding appreciated in SN patients is an increase in clinical severity during puberty and pregnancy. The increase in severity during pregnancy is directly related to increased activity of progesterone receptors on NF1 tumors.

Association with Malignancy:

Recent literature has shown that patients with SN have an increased risk of developing malignant tumors. Ten patients with SN and malignancies have been reported to date. The incidence of malignancies in patients with SN is 5.3%, compared to the 7% lifetime risk for cancer in documented patients with NF1. The two most common malignancies in patients with SN are malignant peripheral nerve sheath tumors and melanoma. This demonstrates the importance of surveillance of patients with SN for any suspicious cutaneous lesions or systemic symptoms.

PATHOLOGY

Epidemiology and Classification:

While neurofibromatosis type 1 (NF1) is primarily inherited in an autosomal dominant fashion, the majority of SN cases have no consistent pattern of genetic transmission. It is generally considered a non-autosomal disorder. A literature review of 82 cases of SN showed that 93% of patients with NF had no family history. However, exceptions to this rule exist and nine cases of SN transmitted to offspring in a familial pattern have been reported. There has been two case reports of an offspring affected with generalized NF with the history of one of the parents having NF. The large majority of SN cases can be explained by a post-zygotic somatic mutation on the NF1 gene present on chromosome 17. The somatic mutation occurs during the early embryonic period in cells that are not terminally differentiated and SN is believed to be the origin of the rare cases of familial transmission that can result in offspring with generalized NF1.

Recent literature has shown that patients with SN have an increased risk of developing malignant tumors. Ten patients with SN and malignancies have been reported to date. The incidence of malignancies in patients with SN is 5.3%, compared to the 7% lifetime risk for cancer in documented patients with NF1. The two most common malignancies in patients with SN are malignant peripheral nerve sheath tumors and melanoma. This demonstrates the importance of surveillance of patients with SN for any suspicious cutaneous lesions or systemic symptoms.

Genetics:

While neurofibromatosis type 1 (NF1) is primarily inherited in an autosomal dominant fashion, the majority of SN cases have no consistent pattern of genetic transmission. It is generally considered a non-autosomal disorder. A literature review of 82 cases of SN showed that 93% of patients with NF had no family history. However, exceptions to this rule exist and nine cases of SN transmitted to offspring in a familial pattern have been reported. There has been two case reports of an offspring affected with generalized NF with the history of one of the parents having NF. The large majority of SN cases can be explained by a post-zygotic somatic mutation on the NF1 gene present on chromosome 17. The somatic mutation occurs during the early embryonic period in cells that are not terminally differentiated. SN is believed to be the origin of the rare cases of familial transmission that can result in offspring with generalized NF1.

Recent literature has shown that patients with SN have an increased risk of developing malignant tumors. Ten patients with SN and malignancies have been reported to date. The incidence of malignancies in patients with SN is 5.3%, compared to the 7% lifetime risk for cancer in documented patients with NF1. The two most common malignancies in patients with SN are malignant peripheral nerve sheath tumors and melanoma. This demonstrates the importance of surveillance of patients with SN for any suspicious cutaneous lesions or systemic symptoms.

Somatic neurofibromatosis is not transmitted to offspring because it does not occur in non-affected cells. The post-zygotic somatic mutation occurs during the early embryonic period in cells that are not terminally differentiated. SN is believed to be the origin of the rare cases of familial transmission that can result in offspring with generalized NF1. The two most common malignancies in patients with SN are malignant peripheral nerve sheath tumors and melanoma. This demonstrates the importance of surveillance of patients with SN for any suspicious cutaneous lesions or systemic symptoms.

Recent literature has shown that patients with SN have an increased risk of developing malignant tumors. Ten patients with SN and malignancies have been reported to date. The incidence of malignancies in patients with SN is 5.3%, compared to the 7% lifetime risk for cancer in documented patients with NF1. The two most common malignancies in patients with SN are malignant peripheral nerve sheath tumors and melanoma. This demonstrates the importance of surveillance of patients with SN for any suspicious cutaneous lesions or systemic symptoms.

TREATMENT:

The management of cutaneous manifestations of SN can provide immense benefit to the patient. Current treatments for cutaneous manifestations of SN are present on consensus standard therapy. Cutaneous neurofibromas and cutaneous-axillary involvement that are bothersome to the patient can be removed. The most common technique to remove neurofibromas is excisional surgery. This may be time consuming and can result in pain and scarring. Laser ablation and electrocautery has been used on numerous occasions. However, reoccurrences can occur. Recent research has shown that CO2 laser treatment for neurofibromas can be effective and provide a high level of patient satisfaction and minimal pain. In one study using Lumenis 30CO2 laser, more than 90% of the 108 patients in the study were pleased with the treatment. The drawback to the treatment was a 1.5% risk of keloid and an 8% risk of hypopigmentation. Another study using a combination of shave excision and laser photothermolysis with a 1,444 nm Nd:YAG laser showed excellent results. A seven month follow-up showed no visible recurrence of neurofibromas or scars. Simid et al. treatment of neurofibromas with electrocautery was effective. Electrocautery allows for quick treatment of numerous lesions with instant hemostasis and minimal thermal damage to surrounding tissue. In one study, all 97 patients treated with electrocautery were satisfied with the results and had minimal scarring.

CONCLUSION

SN is a rare and atypical variant of neurofibromatosis. Our case represents a typical clinical presentation of SN without generalization. The patient denied any familial history of neurofibromatosis or systemic complaints. The patient has one healthy offspring with no signs of neurofibromatosis. Close monitoring is vital for all patients with SN. Additionally, the cutaneous manifestations of SN can inflict emotional distress on patients. Counseling and cosmetic treatments should always be offered to patients. In addition to counseling, our patient had shave removal of the larger neurofibromas and electrocautery of the smaller lesions with no complications.

REFERENCES