Plexiform neurofibroma

- Involvement of Cranial Nerve Ganglion as an Independent Risk Factor for Malignant Transformation of Head and Neck Plexiform Neurofibromas in Neurofibromatosis Type 1
- Qualitative aspects of pain in children and adults with neurofibromatosis type 1 and plexiform neurofibromas: Causes, consequences, and communication
- Malignant peripheral nerve sheath tumor in early childhood: a case report of a diagnostic challenge
- Comment on: "selumetinib use as targeted therapy for plexiform neurofibroma: a comprehensive review of the literature" - mirdametinib as the emerging standard in NF1-PN
- Buttock Reconstruction With Hatchet-type Lumbosacral Flap After Resecting Diffuse Plexiform Neurofibroma With Methicillin Resistant Staphylococcus aureus-infected Intratumoral Hematoma
- Single-cell tumor microenvironment profiling informs a circulating proteome test for the interception of malignant transformation in NF1 nerve sheath tumors
- Plexiform Schwannoma of the Foot: A Case Report
- A clinical case of type 1 neurofibromatosis associated with a rare genotype

Definition

Plexiform neurofibroma is a benign nerve sheath tumor arising from multiple nerve fascicles and their branches, typically associated with Neurofibromatosis Type 1 (NF1).

Key Features

Histology: Composed of Schwann cells, fibroblasts, and perineural cells, interwoven within a myxoid stroma.

Growth Pattern: Diffuse, infiltrative, and often entwined within nerve plexuses, hence the term plexiform.

Location: Can involve any part of the body but commonly affects the head, neck, or extremities.

Clinical Presentation: Presents as a soft, often painless mass with a “bag of worms” texture on palpation.

Risk of Malignancy: Has a significant risk (~10–15%) of malignant transformation into a malignant peripheral nerve sheath tumor (MPNST), particularly in NF1 patients.

Diagnosis: Often diagnosed clinically and confirmed with MRI and histopathology.

Management: Surgical resection is challenging due to its infiltrative nature; newer treatments include MEK inhibitors (e.g., selumetinib) for inoperable cases.

Epidemiology

Uncommon variant of neurofibroma.

Plexiform Neurofibroma Classification

Plexiform neurofibromas (PNFs) are complex peripheral nerve sheath tumors that are virtually pathognomonic for **neurofibromatosis type 1 (NF1)**. They originate from multiple nerve fascicles and extend along the length of nerves, often involving surrounding tissues. Classification systems are used for **diagnostic**, **prognostic**, and **therapeutic planning** purposes.

1. Anatomical Classification

- **Superficial (cutaneous) PNF**:
  - Involves dermal or subcutaneous tissues.
  - Usually visible or palpable as soft masses.
  - Lower risk of malignant transformation.
- **Deep (internal) PNF**:
  - Involves deeper nerve trunks (e.g., brachial plexus, sacral plexus).
  - Often infiltrative and extensive.
  - Higher risk of complications and malignant transformation.
  - May affect visceral organs or spinal roots.

2. Radiological Classification (based on MRI/CT)

- **Fusiform**:
  - Focal, spindle-shaped tumor along a nerve.
  - Often easier to resect.
- **Nodular**:
  - Discrete nodules along peripheral nerves.
  - May be multiple.
- **Diffuse infiltrative**:
  - Ill-defined, infiltrative mass with indistinct margins.
  - Often extends along large nerve segments and into surrounding tissues.
  - Common in the head and neck region. see Head and Neck Plexiform Neurofibroma

3. Functional Classification

- **Asymptomatic PNF**:
  - Detected incidentally.

    - Observation typically sufficient.

- **Symptomatic non-disfiguring PNF**:
    - Causes pain, functional impairment, or neurological deficits.
    - Consider surgery or medical therapy.

- **Symptomatic disfiguring PNF**:
    - Causes visible deformity and/or disfigurement.
    - May require multidisciplinary management.

4. Risk-Based Classification

- **Low-risk PNF**:
    - Small, superficial, asymptomatic.
    - Stable in size over time.

- **High-risk PNF**:
    - Large, deep, growing, painful, or affecting critical structures.
    - Associated with increased risk of **malignant peripheral nerve sheath tumor (MPNST)**.

5. WHO Classification (Histological)

- Plexiform neurofibroma is classified under:
    - **Benign peripheral nerve sheath tumors (BPNSTs)**.
    - WHO Grade: benign, non-encapsulated.
    - Risk of malignant transformation (10-15% in NF1 patients).

6. Genotype-Phenotype Correlations (Emerging)

- Some NF1 mutations (e.g., whole-gene deletions) are associated with:
    - Earlier onset.
    - Larger burden of PNFs.
    - Higher malignancy risk.

Clinical features

Plexiform neurofibromas usually presents with symptoms due to large size and site [1)].

Management and Surveillance

- Regular **MRI surveillance** every 6–24 months based on clinical course.
- **Surgical debulking** may relieve symptoms but complete resection is often not feasible.
- **Selumetinib** (a MEK inhibitor) is approved for symptomatic, inoperable PNFs in children with NF1 — tumor shrinkage in ~70%.

- Requires a **multidisciplinary approach**: neurology, neurosurgery, oncology, plastic surgery, and rehabilitation as needed.

Treatment

Plexiform neurofibroma treatment

Prognosis

Plexiform neurofibroma prognosis.

1)
Pollack IF, Colak A, Fitz C, Wiener E, Moreland M, Mulvihill JJ. Surgical management of spinal cord compression from plexiform neurofibromas in patients with neurofibromatosis 1. Neurosurgery. 1998 Aug;43(2):248-55; discussion 255-6. PubMed PMID: 9696077.