

Wallerian Degeneration Surveyed in Poliomyelitis

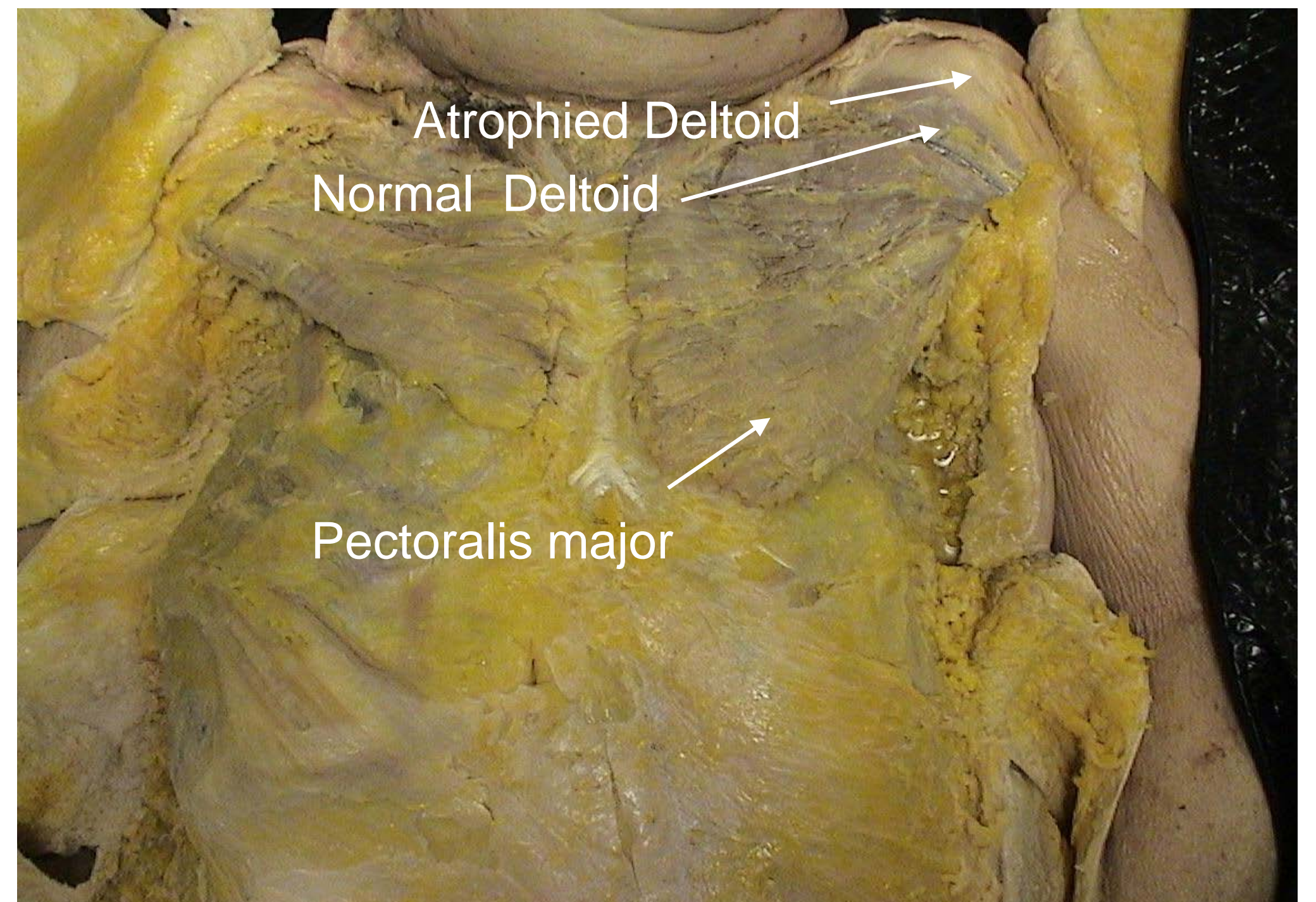
Frank Song Jr.¹, Katherine Zitolo¹, Alyesia Pavlyukovets¹, David R. Terfera¹, and Kevin R. Kelliher²

¹ College of Naturopathic Medicine, University of Bridgeport, Bridgeport, CT ; ² College of Chiropractic, University of Bridgeport, Bridgeport CT.

Introduction

Poliomyelitis is a highly infectious disease rendering varying degrees of respiratory illness, gastroenteritis, malaise and potentially severe forms of paralysis. Infection is generated by a virus belonging in the Picornaviridae family.² This enterovirus infects the human body most often through the fecal-oral route and proliferates within the mucosa of the pharynx and gastrointestinal tract.¹ The virus ordinarily invades the lymphoid tissue and enters the bloodstream where it may enter the central nervous system and infect motor neurons in the ventral horn of the spinal cord and brainstem.¹ Replication of the virus within the motor neurons induces neuronal cell death and axonal degeneration, resulting in the denervation of skeletal muscle and the subsequent manifestation of poliomyelitis.¹ Patients with poliomyelitis will experience asymmetric muscle atrophy and flaccid paralysis.⁴ Here, we report on a case of a 67 year old male cadaver with poliomyelitis discovered during a routine cadaveric dissection in the gross anatomy lab at the University of Bridgeport.

Figure 3



Anterior thoracic wall of donor with poliomyelitis. The left deltoid muscle has undergone severe atrophy as demonstrated by the loss of skeletal muscle fibers from over half of the muscle. A portion of the deltoid muscle retains some fibers. As a comparison, the ipsilateral pectoralis major muscle has not undergone the same atrophy.

Figure 1

Denervation Atrophy

When motor neuron input to a muscle is lost the muscle fibers innervated by that neuron will begin to degenerate.

This process is called denervation atrophy.

The result is muscle weakness and paralysis.

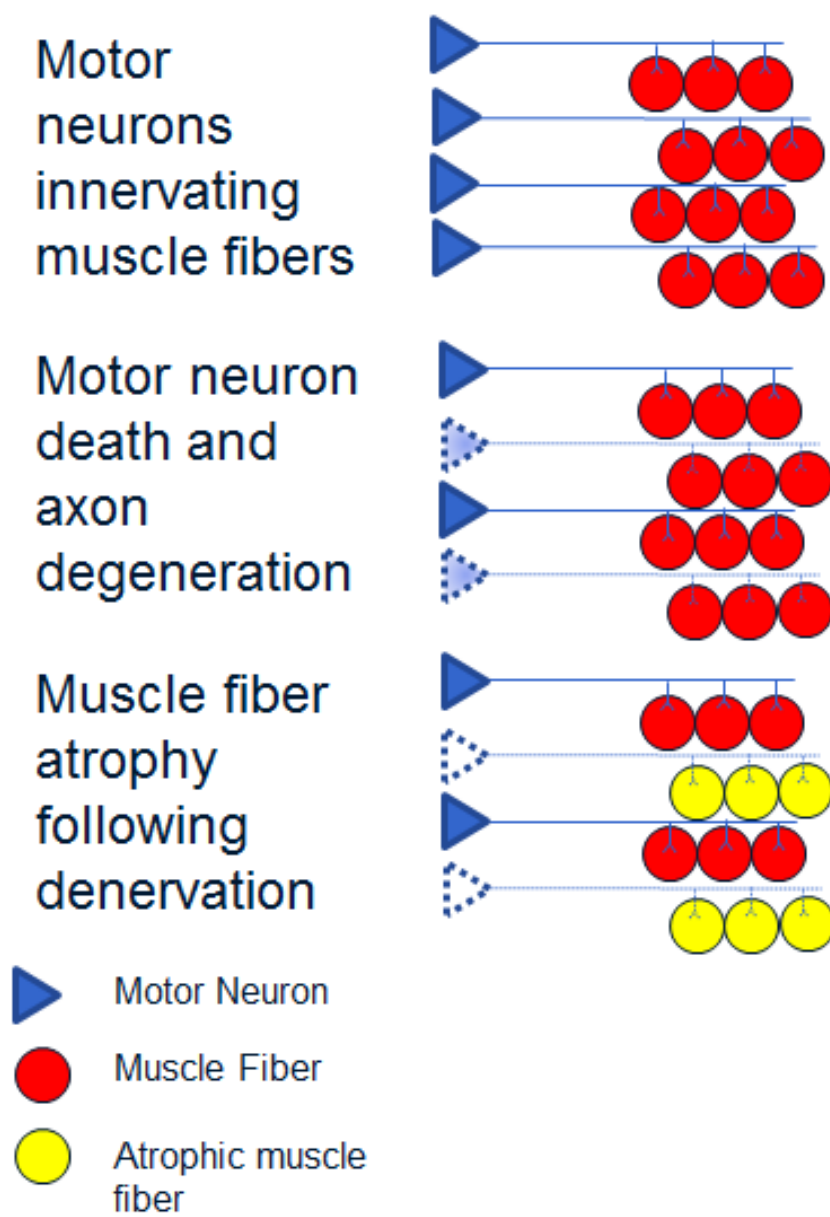
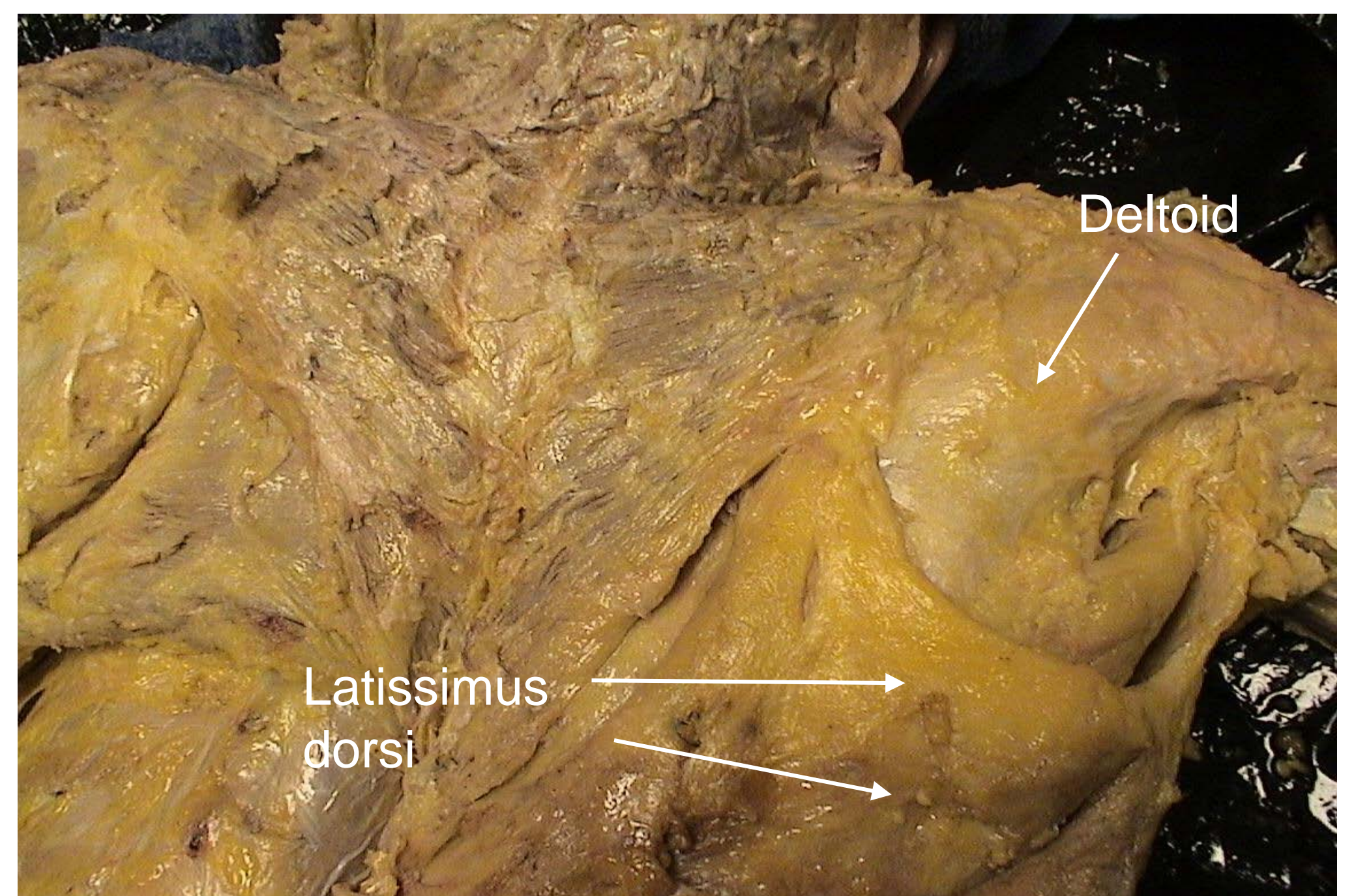
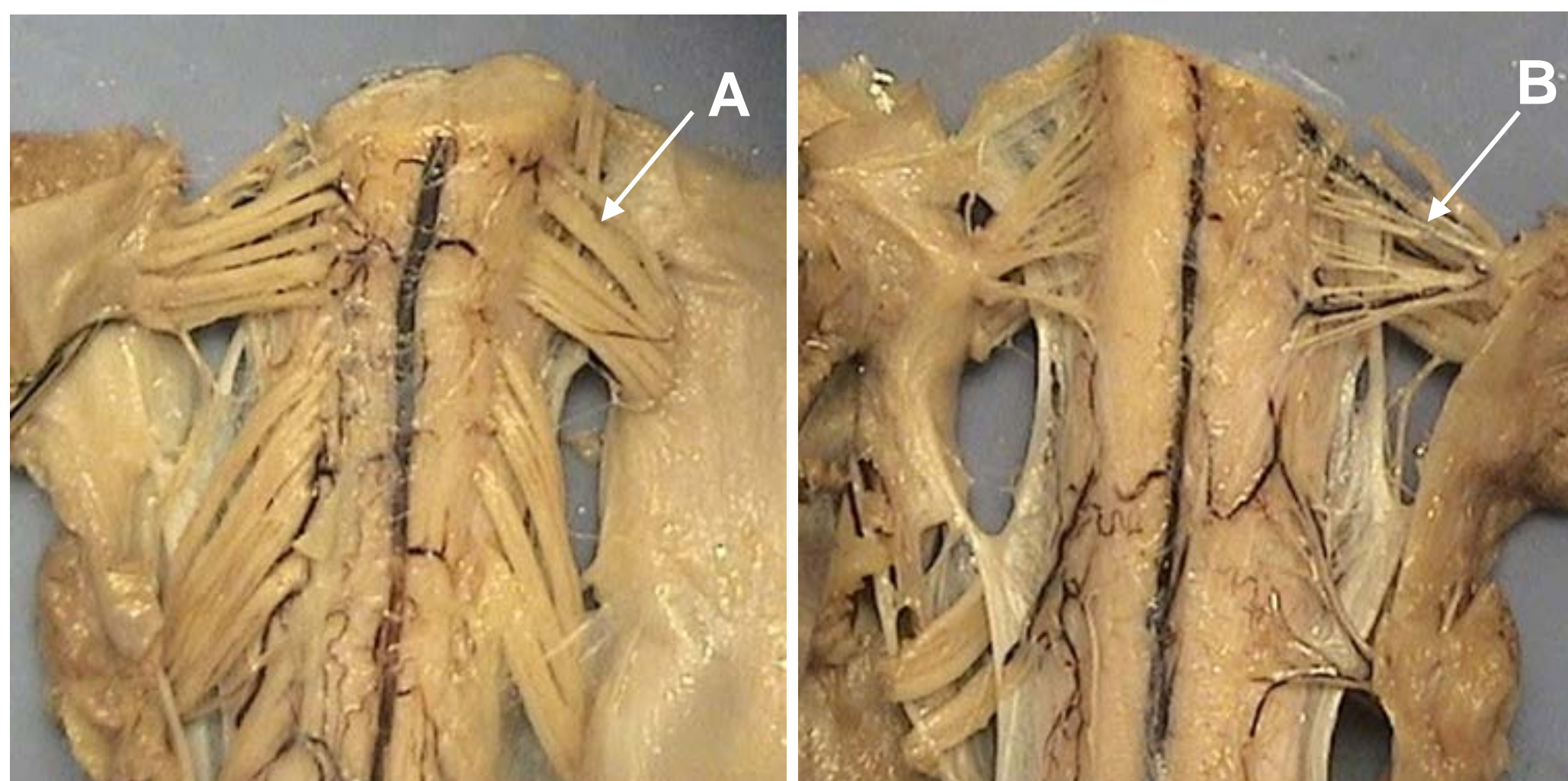


Figure 4



Back and shoulder of donor with poliomyelitis. The deltoid and latissimus dorsi muscles were significantly atrophied. We observed increased fat deposition where muscle fibers degenerated.

Figure 2



Cervical spinal cord of donor with poliomyelitis. The dorsal roots (A) have a significantly larger diameter than the ventral roots (B). The ventral roots of the spinal cord innervate skeletal muscle. The decreased size of the ventral roots can be attributed to the death of motor neurons as a result of the poliomyelitis infection.

Discussion

Motor neuron diseases (MND) such as Polio and Amyotrophic lateral sclerosis (ALS) have no cure nor standardized treatment.³ Management of the disease and improving quality of life includes treating muscle weakness and fatigue, musculoskeletal pain, joint instability, respiratory dysfunction, and sleep disorders.⁵ Physical therapy, occupational therapy, and naturopathic medicine in multidisciplinary clinics are particularly important in the care of patients with MNDs. Maintaining proper nutrition and a balanced diet are important for patients with MNDs in order to maintain weight and strength.³ Hydrotherapy, a modality of naturopathic medicine can be used to stimulate circulation, manage pain. It has also been shown that long term ventilated patients benefit from hydrotherapy.⁸ Passiflora, a botanical remedy often used in naturopathic medicine can be used to treat anxiety and sleep disorders in patients with MNDs.⁷

References

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