Origin of the Hour-Glass Deformity in Compressed Nerves

If we examine the physics of nerve compression in detail, it becomes apparent that there may exist a misconception. 'Compression' means to become pressed into a smaller space. In nerve compression syndromes, it is absolutely clear that a site of reduction in size of the nerve is apparent. This is found at surgery and on radiological investigations such as MRI and ultrasound. But since nerves are full of water (which is not substantially compressible) how is it possible that a nerve could become smaller when compressed?

Actually, it may be that nerves do not actually get smaller generally and instead they distort in shape according to their malleability. It could be that, whilst the transverse dimension under the site of pressure reduces, equivalent expansion occurs in other areas, keeping the volume very similar. This is shown in the 'hour-glass deformity' often seen in compressed nerves in which there is constriction at one point but swelling either side of the site of pressure.

Of course, in the clinical situation, other temporal factors could come into play; such as blood flow, axonal transport, degeneration, oedema and inflammation.

But, at least acutely and instantaneously, it may be that the overall volume of nerves remains relatively stable between the uncompressed and compressed states - food for thought on our understanding of 'nerve compression'

Picture - motor branch of the median nerve of a patient who I followed through to surgery (the nerve faces almost vertically). Swelling is noticeable above and below the site where the nerve was compressed by the neighbouring myofascial tissue (resected). This picture was taken immediately after decompression but before the nerve had time to refill. The delay in perfusion was due to the tourniquet on the patient's arm.

You can learn how to palpate this nerve on our upper quarter neurodynamics course - see international schedule.

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