

Splinting and Functional Electrical Stimulation

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Electrical stimulation of the upper limb can be a valid and useful adjunct to therapy. However clinicians often find it a more complicated process and at times less successful, in part due to the lack of functional triggers which make goal directed activity more difficult. Other problems include a higher incidence of fixed contracture, an increased need for accurate electrode positioning, the importance of appropriate positioning of the limb for activity and the influence of antagonist hypertonus on small unstable joints in the wrist and hand.



Intrinsic instability in the hand is an integral problem. Lumbrical/interossei control may be poor and ligaments weak. Muscle imbalance and tonal variations may exist between the long flexors and extensors passing over several joints in the forearm and hand. This will have different effects on joints depending on their individual stability. For example, when forearm and wrist extensors are stimulated, highly mobile joints such as the wrist joint, the thumb CMC joint and the finger MCPs are prone to hyper-extension. As a result PIPs and DIPs are pulled into flexion when length in the long flexors is limited. Patients can find stimulation impossible because of consequent pain or co-existing degenerative joint disease.

A solution to these problems is to provide external support at the hypermobile joints to control excessive motion from FES through splinting. Joint protection and pain control can be achieved. Stimulation is targeted more specifically to produce movement at required joints. Tension on long flexor tendons is released allowing greater movement more distally. The limb can be more easily placed in a functional position for stimulation and reactive spasm can be better controlled. By resting the limb in the splint for a period of time after stimulation, carry-over for range of motion and tone control can be improved. Casts can be serialised as muscles lengthen and range of movement improves.



At Salisbury a block of funding was set aside to purchase materials and time to splint 13 FES patients over 6 months this year. The majority of splints were made for the hand although elbow drop-out casts were also found useful to combine with triceps stimulation. Soft-cast/ scotch-cast materials were used as we lack facilities for thermoplastic splinting although these would have been useful splints to use.

Over the coming months we hope to review outcome measures and produce a series of case reports. A business case will be presented to establish a combined FES and splinting service at Salisbury for those patients who are unable to have their needs met locally. Guidelines for co-ordinating with BOTOX treatment need to be developed and there may be a role in treatment of the lower limb. Further reports will be made in due course.

I would very much appreciate anyone's comments, thoughts, questions or experiences about combining splinting and FES.