Limb spasticity can be due to any cranial and spinal pathology. Such problems can be partially or subtotally cured by selectively dividing the over excited nerve fascicles which are responsible for spasticity.

Here we review the literature and share our experience of few cases of severe spasticity of hand who underwent selective median nerve neurotomy and got better.

An 18-year-old girl presented with severe spasticity of left hand since early childhood due to meningitis. She had severe flexion deformity of all the fingers, thumb and wrist.

Another case, a 20-year-old boy with the history of some brain tumor operated few years back, came to my clinic with severe spasticity of right hand and fingers since then. He was not able to use his right hand and was like handicapped.

There was significant cosmetic correction of the hand and fingers after selective neurotomy of median nerve in both the cases though function was still poor.

Surgery was performed under general anesthesia with muscle relaxant stopped while stimulating the nerve. Median nerve was exposed both above and below the elbow. The motor branches to the major muscles of the forearm were stimulated with train of four nerve stimulator. The nerve which was supplying the overexcited muscles, according to preoperative assessment, was partially divided.

In conclusion, selective peripheral nerve neurotomy is an established procedure for spastic deformity of limbs. It has not yet become a routine procedure in Nepal. This procedure is very helpful to recover the affected limb, at least from cosmetic point of view.

Key Words: cosmetic problem, peripheral neurotomy, recovery, spastic deformity
Focal spasticity of the limbs can be partially or subtotally cured by selectively dividing the over excited nerve fascicles which are responsible for spasticity. Examples of selective neurotomy for focal limb spasticity are sciatic neurotomy for knee flexion spasticity, musculo-cutaneous neurotomy for elbow flexion spasticity, median nerve neurotomy for finger flexion spasticity and so on. Deltombe T et al have given illustration of Tibial neurotomy as an effective and durable treatment for spastic equinovarus foot. 2, 3

Significant cosmetic improvement of the limb has been reported after selective neurotomy though functional improvement is questionable. 5, 8, 9 Therefore, selective neurotomy has already become an established surgical procedure for harmful and resistant type of limb spasticity.

Here, we report few cases of severe spasticity of hand on whom we did selective median nerve neurotomy after which they got better. There are no reported cases of such surgical procedure of median nerve in Nepal so far.

The main purpose of this article is to revise the literature in this field of neurosurgical science and to share few of our experiences.

Case 1

A young girl of 18 years of age, presented with severe spasticity of left hand since early childhood. She had history of suffering from meningitis during her early childhood. Since then she was not able to move her hand properly and was almost non functioning. On examination she had severe flexion deformity of all the fingers and thumb, pronation deformity of the hand and slight flexion of wrist. Patient was well counseled about possibility of cosmetic correction and functional correction to some extent after surgery but not complete cosmetic and functional correction. There was significant cosmetic correction of the hand and fingers after surgery though function was still poor.

Case 2

A 20-year-old boy with the history of some brain tumor surgery few years back came to my clinic with severe spasticity of right hand since surgical procedure. He was not able to use his right hand and was like handicapped. It also looked odd cosmetically. On examination he had flexion deformity of all the fingers including thumb. There was slight flexion of wrist. He underwent physiotherapy and other medical treatment which was not that helpful. Finally he came to us and underwent selective neurotomy of nerve. There was significant cosmetic and functional improvement though residual deformity was present.

Figure 1: Pictures of case no. 1, showing preoperative deformity of left hand (A, B) and post operative correction (C, D)

Figure 2: Pictures of case no 2, before surgery (A) and after surgery (B)
Surgical Procedure

Severe spastic deformity of hand and fingers not better with other treatment was the main indication of surgery. Thorough pre-operative evaluation was done to assess different muscles involved. Surgery was performed under general anesthesia with the deformed upper limb stretched in pronation position. Curvilinear incision given over the flexor surface of the forearm. The incision started on mid upper arm and extended below up to almost mid forearm. Median nerve was exposed both above and below the elbow. The motor branches to major muscles of the forearm such as nerve to pronator teres, flexor digitorum profundus, flexor digitorum superficialis, extensor carpi radialis, extensor pollicis bravis, flexor pollicis bravis etc. Each nerve is clearly separated, nerve sheath opened and fascicles separated. Muscle relaxant is stopped. Each fascicle is stimulated with train of four nerve stimulator with the help of nerve stimulating needle. The nerve which is supplying the overexcited muscles, according to preoperative assessment, is divided. About 50-80% of total nerve fascicles of a nerve was divided according to degree of muscle spasticity or deformity.

Discussion

Many studies have shown that selective neurotomy is the proper procedure to correct hand spasticity involving wrist and fingers. It is an effective procedure in the treatment of segmental harmful spasticity after failure of a conservative treatment including physiotherapy and antispasmodic medications. It must be performed before the fixed deformities and other orthopedic complications arise. Msaddi AK et al have shown in his study that selective neurotomy for different types of spasticity was very helpful.

They treated children with spastic cerebral palsy by microsurgical selective peripheral neurotomy. They did neurotomy of posterior tibial nerve for spastic foot deformity, ulnar and median nerves for spastic flexion of wrist and fingers, sciatic nerve for spastic knee flexion associated with spastic foot deformity and obturator nerves for spastic adductors.

Sitthinamsuwan B et al have tried this procedure in bed ridden patients who suffered from severe proximal lower limb spasticity. They have found patient return to sitting and ambulate with a wheelchair after selective peripheral neurotomy of the sciatic and obturator nerves. Median nerve is one of the commonly involved nerves. Studies have shown that the selective motor fasciculotomy of musculocutaneous, median, and ulnar nerves significantly reduces spasticity in the affected muscle groups and thereby improves the self-care (motor) functions in selected people with cerebral palsy who have harmful resistant spasticity without any organic shortening of the muscles.

Selective Neurotomy

Kwak KW et al also have shown that selective median neurotomy (SMN) is an effective procedure in achieving useful, long-lasting tone and in gaining voluntary movements in spastic wrists and fingers with low morbidity rates.

Use of Local anesthetic agent for nerve block has also shown its effect as that of selective neurotomy. Only difference is that it has short term effect and is useful for diagnostic purpose only. Therefore preoperative evaluation with the use of local anesthetic agents will also be very useful mainly for planning operative procedure.

The surgical procedure itself is safe with minimal morbidity. It is effective for long term outcome. However appropriate case selection is the most. In our case also we did several treatments before finalizing for surgery. Both the case has history of the problem for several years and they had been treated with multidisciplinary specialist including orthopedic surgeon, neurorologists, physiotherapist etc. Since nothing was helpful we planned for selective neurotomy.

Buffenoir K, et have mentioned that longer the duration of spasticity poorer will be the outcome and more will be the possibility of recurrence. In our experience, 1st case had history of left hand spasticity since early childhood and 2nd case had the problem since few years back. Both the cases had significant improvement and no signs of recurrence yet since more than a year of follow up.

Only selective neurotomy is not sufficient in many cases. Many other treatment modalities are necessary to obtain the best level of outcome as mentioned by Steinbok P. Treatment modalities other than selective neurotomy are physiotherapy, occupational therapy, oral spasmolytic and antidystonic drugs, botulinum toxin injections, orthopedic procedures, continuous infusion of intrathecal baclofen (ITB), selective dorsal rhizotomy (SDR). Sometimes even multi stage surgery is required.

In our context, multi stage surgery seems to be less feasible due to financial issues. Physiotherapy and medications are easily available but don’t seem to be that effective. Orthopedic procedures can definitely be helpful supplement if affordable. However, the outcome by only selective neurotomy also seems to be quite rewarding in our experience.

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