

HAND SURGERY

HS01 MANAGEMENT OF OBSTETRIC BRACHIAL PLEXUS PALSY AT MIDDLEMORE HOSPITAL

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In the year 2000 a surgical service for infants with obstetric brachial plexus palsy commenced at Middlemore Hospital in Auckland. This remains the only service available in New Zealand with the two founding surgeons remaining as its current providers. We present the seven-year history of this service, the lessons learned from both primary and secondary reconstructive procedures and consider the direction for future treatment.

HS02 BOTULINUM TOXIN A IN OBSTETRIC BRACHIAL PLEXUS PALSY

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Purpose To evaluate children with obstetric brachial plexus palsy treated with botulinum toxin A (Botox) injections to assist with the management of contracted muscles and joints as well as co-contraction.

Methods Since September 2004, 20 children have been treated. The median age at treatment was 2.1 years (range 7 months to 11 years). As experience was gained, the total dose of Botox increased from 4 to 10 units per kg.

Results 12 patients were treated primarily for restriction of passive external rotation at the shoulder at an average age of 24 months (range 7 to 42 months). This group had the most impressive gains which became apparent within a week of injection. There was a high level of parental satisfaction with an improvement in passive range and increased ease of physiotherapy. Six had excellent and 4 had good results. The two patients who had little improvement had clear indications for surgery. Seven (58%) of these 12 patients went on to have a repeat injection, in 2 cases with a higher dose, aiming to achieve further gains. Five patients were treated for co-contraction of the latissimus dorsi and/or teres major were aged 8 months and from 8 to 11 years. They reported minor gains. All five patients who had triceps injections had improved elbow flexion.

One patient had an over active biceps injected with minor benefit.

Conclusion It is hoped that persistent physiotherapy assisted by botulinum toxin A injections targeting internal rotators can reduce gleno-humeral joint dysplasia, posterior subluxation and the need for open procedures. Shoulder subluxation identified by ultrasound should be further imaged with CT or MRI and be considered for an open procedure.

HS03 BOTULINUM TOXIN A IN THE UPPER LIMB IN CEREBRAL PALSY

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Purpose To evaluate patients with cerebral palsy treated with botulinum toxin A injections to assist with the management of contracted muscles and joints as well as co-contraction.

Methods Since 1998, 40 limbs have been treated. The average age was 14 years (range 4 to 33 years) and the average dose given was 107 units (range 50 to 200 units). Digital flexors were injected in 26 limbs, elbow flexors in 18, wrist flexors in 17, thumb adductors in 13, pronator teres in 9, intrinsic in 3, shoulder abductors in 2 and ECU in one limb. All patients were injected under a general anaesthetic, allowing for an assessment of fixed contractures. Padded plaster casts were applied, putting the injected muscles on full stretch before the reversal of anaesthesia and were maintained for approximately 3 weeks. Thermoplastic splints were then worn 23 hrs per day for a further three weeks. Splints were serially modified to achieve progressively more extension as the flexion contractures were corrected. Simultaneous surgical procedures such as tendon lengthening and transfers were performed in 14 limbs.

Results The results in the elbow flexors were disappointing. The finger, thumb and wrist flexors have responded extremely well, despite fixed flexion deformities being documented under anaesthesia in the majority of patients.

Conclusion It is estimated that the muscle bellies have been elongated by 3 to 4 cm either by the lengthening of, or addition to the sarcomeres.

The results in these patients are vastly superior to that which could be obtained surgically.

HS04 THE USE OF A VISUAL HAND CHART TO AID IN COMMUNICATION OF HAND INJURIES

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The hand is one of the most commonly injured parts of the body, however in a climate of increasingly reduced anatomical teaching, junior doctors are ill equipped to assess and describe hand injuries they encounter in their Emergency Department rotations.

Hand and Plastic surgery registrars are often very busy and can find it time consuming to extract the information they require from junior doctors. Their workload can be managed significantly more effectively with clear, concise and accurate descriptions of hand injuries.

This study was designed to assess the effect of a visual 'hand chart' on junior doctor's assessment and description of common hand injuries. The chart illustrates basic underlying anatomical structures and their relevant surface landmarks, together with the appropriate anatomical terms to describe them.

Two groups of 25 junior doctors were tested. Group A were shown a set of 10 digital images of simple hand injuries and asked to transcribe what they would say to the on call hand surgeon. Group B were given the visual 'hand chart' and tested in a similar fashion with the same set of images. Group A was later retested with the 'hand chart' and a second set of 10 images. Simple demographic information was also collected from participants asking their year since graduation and any prior experience with hand surgery.

A marking key was used to score participants answers and the results were analysed using the students t-test. Significant differences were found between the groups suggesting that the hand chart was a valuable aid in communication. It may thus prove useful in wider contexts, such as remote and rural medical stations.

HS05 CRPS – CURRENT IDEAS ON MANAGEMENT

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Complex regional pain syndrome (CRPS) is characterised by extreme pain and dysfunction of the sympathetic nervous system in one region of the body, usually an extremity.(1) It involves the somatosensory, sympathetic and the somato-motor systems. It consists of local neurogenic inflammation out of proportion to injury; severe pain in the skin, subcutaneous tissues and joints; and central hyperexcitability that is often compounded with a sympathetic component. It is multifaceted manifesting both central and peripheral neurologic pathophysiology, including a prominent psychosocial component.

Mechanisms include trauma related cytokine release, exaggerated neurogenic inflammation, sympathetic afferent coupling, adrenoceptor pathology, glial cell activation and cortical reorganisation.(2)

Diagnostic criteria and tests used will be discussed. Biomedical interventions include the use of primary and secondary analgesics, neural blockade, sympathectomy, ketamine, bisphosphonates, and spinal cord/peripheral nerve stimulation. Psychological and behavioural factors can exacerbate the pain and dysfunction associated with CRPS.(3) Mirror visual feedback was introduced recently for rehabilitation but needs to be evaluated in randomized controlled trials.(4)

References

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HS06 THE CURRENT MEDICAL MANAGEMENT OF NEUROPATHIC PAIN

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This title is sure to be a turnoff for most surgeons!

Neuropathic pain is a term that has been brought to prominence with the marketing of the drug, Neurontin. Neuropathic along with nociceptive are two general terms used to classify pain symptoms. Nociceptive often refers to pain symptoms that are amenable to the surgical knife whereas neuropathic often involves more central mechanisms.

Management of neuropathic pain is generally based around the use of prescription medication. I will briefly detail what is hot and what is not in neuropathic analgesia. Information will be provided on neuromodulation/surgical techniques that modulate central nervous system transmission. My experience of spinal cord stimulation in a case of extreme CRPS will be presented.

HS07 TOE TRANSFER – TECHNIQUES & RESULTS

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Toe to thumb-finger transfer requires the understanding of microsurgery and reconstructive technique. The success is measured by the viability of the toe and eventually recreating the function of the original loss.

In harvesting of the toe, the big and second toe follows almost the same technique. Identifying the toe artery over the first web space and then dissecting proximally into the intermetatarsal artery is the best approach. To dissect the artery from proximal to distal is often fraught with many dangers. In my cases about 50% the plantar artery is dominant. Anticipation and planning of the artery length is crucial.

In toe to thumb transfer the choice can be 2nd toe, total big toe, trimmed big toe or wrap around transfer. In our local populations, 2nd toe is always a good choice. First reconstruction with flap resurfacing may be necessary if the thumb amputation is very proximal.

Toe to fingers transfer is usually indicated in 4 finger loss of the hand. In toe to finger transfer I prefer the two 2nd toes transfer into the middle and ring finger position. As the transferred toes can regain less than 50% of motion, the positioning of the toes should be opposable to the thumb.

The concept of total reconstruction should be closely followed. Stable skeletal fixation, tendon weave technique, good nerve repair, adequate skin coverage and primary healing are important to ensure good outcome result.

HS08 CONGENITAL HAND: THE DEFORMITY-DEFICIENCY INDEX

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Congenital hand is a complex and vast subject therefore classification is very necessary for the purpose of teaching, communication and guide treatment. The first comprehensive and yet user friendly classification was proposed by Swanson et al. in 1976. This classification based on etiopathogenic is popularly known as the 'IFSSH 7 groups classification'. (I) Failure of formation: transverse or longitudinal (II) Failure of differentiation (III) Polydactyly (IV) Overgrowth (V) Undergrowth (VI) Amniotic band syndrome (VII) Generalized skeletal syndromes. However this classification was found not able to satisfactorily classify 20–30% of cases.

Other classifications based on genetic defects, teratogenic sequence and syndromics were being introduced previously and continue to be used parallel with the IFSSH classification. Furthermore the classification continue to be besieged by multiple morphological types of deformity in a same hand. Ogino introduced the JSSH expanded classification to address some of the deficiencies of the IFSSH classification.

For a beginner in treating congenital hand, it is indeed daunting, as the variations in morphology, the degree of severity and functional deficit even in the same diagnosis can be very different. It is usual to find further sub classifications.

For the purpose of guiding treatment, I propose the concept of deformity/deficiency index. Group I) The imbalance/ small in size II) Extra digits III) Mal positioned/ Mal-aligned IV) Poor/ No function V) Total absent. The residual functional decreases from group I to V. And similarly the reconstruction becomes complex and difficult.

HS09 REPLANTATION SURGERY – THE RECONSTRUCTIVE APPROACH

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Singapore

The function of the replanted parts can be improved if attention to reconstruction techniques is carried out. These reconstructive techniques are: 1) adequate debridement and shortening, 2) stable skeletal fixation, 3) strengthened tendon repairs, 4) quality nerve repair, 5) extensive vascular anastomosis, 6) complete skin coverable, and 7) Early intensive active rehabilitation.

- 1) The debridement should be generous and the shortening judicious. More than 50% of the skin should be in direct contact, and direct anastomosis of some of vessels should be possible.
- 2) The skeletal stabilization should be of good very quality that will allow free mobilization of the joints.
- 3) The repair of the tendons should take advantage of the excess length for a strengthen repair. Some degree of active mobilization should be make possible.
- 4) Primary nerve grafting or nerve transfer should be considered if there is loss of nerve length.
- 5) Vascular repair should be on the basis of as many as possible the number of arteries and veins that can be found for anastomosis.
- 6) Any residual skin defect should be planned for a proper resurfacing within the next 5 to 10 days.
- 7) Early intensive active rehabilitation should be prescribed. Gradual active ROM for tendon gliding should be instituted with in the first week.

The function of the replanted digit and hand has continued to improve with the reconstructive approach. With further experience the reconstructive approach can be done in all cases with confidence.

HS10 FLAP COVERAGE IN UPPER LIMB INJURIES

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The severely of skin loss and the options of resurfacing is determined by taking into account the following factors. 1) The size & location of the defect, 2) The depth of the defect and the quality of the tissue bed, 3) The extent of exposed vital structures, 4) The associated bone and other tissues injuries, 5) The availability of donor skin flap.

The size of the defect is the most important factor in choosing a resurfacing option. The size can be categorized into small, medium and large. A small defect is one that is less than 5 cm² in size, a medium defect is between 5 to 15 cm², and a large defect is greater than 15 cm².

Local flaps are usually sufficient to cover small defects <5 cm². These are advancement flaps or rotation and transposition flaps.

Regional flaps are indicated to resurface these medium-sized defects 5 to 15 cm². The donor is within the same region of the hand, from one of the digits or from dorsum and palmar surfaces of the hand. It is usually based on vascular or NV pedicles.

Large defects >15 cm² will need larger flaps for coverage. These large flaps are pedicled distant flaps and free flaps. In these severe injuries, there is usually associated bone and soft tissues injuries. These injuries can be reconstructed as a single stage combined reconstruction or multi-staged reconstructions. The resurfacing should always be given priority.

**HS11
POST-OPERATIVE HAND PAIN ASSESSMENT****L. C. TEOH***Singapore*

Hand is a very heavily innervated organ. Therefore any traumatic injury or surgical insults will provoke severe pain. Adequate pain management should be given in all the cases. Early motion is always necessary in all operated hands. It is uncertain as to the causes of excessive pain occurring in some patient. It is interesting to note that a hand with complex injury require flap surgery can be less painful in comparison to a lesser crushing injury that require minor repairs.

Excessive pain that is out of proportion should be identified early in the follow up. Patient with pain that is unrelenting, not relieved with NSAID and disturbs sleep (after excluding all causes of complication) is a candidate to developing CRPS. In the first 2 weeks of follow up this is the stage "nascent CRPS".

Nascent CRPS can be aborted if correctly managed. All pain provoking therapy should be stopped. Only active motion that is not pain provoking is allowed. Contact stimulation is very useful in reducing pain, it works on the basis of "gate-control". Self gentle rubbing of the hand on rough fabric cushion is performed hourly for 5–15 minutes. The gentle motion also moves all the normal joints in the upper limb that further suppresses pain.

Excessive pain that continues beyond the duration of 6 weeks is very likely to develop into established CRPS.