Obstetric Brachial Plexus Palsy in Children

Essay submitted for the partial fulfillment of the Master Degree in Orthopaedic Surgery

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1997

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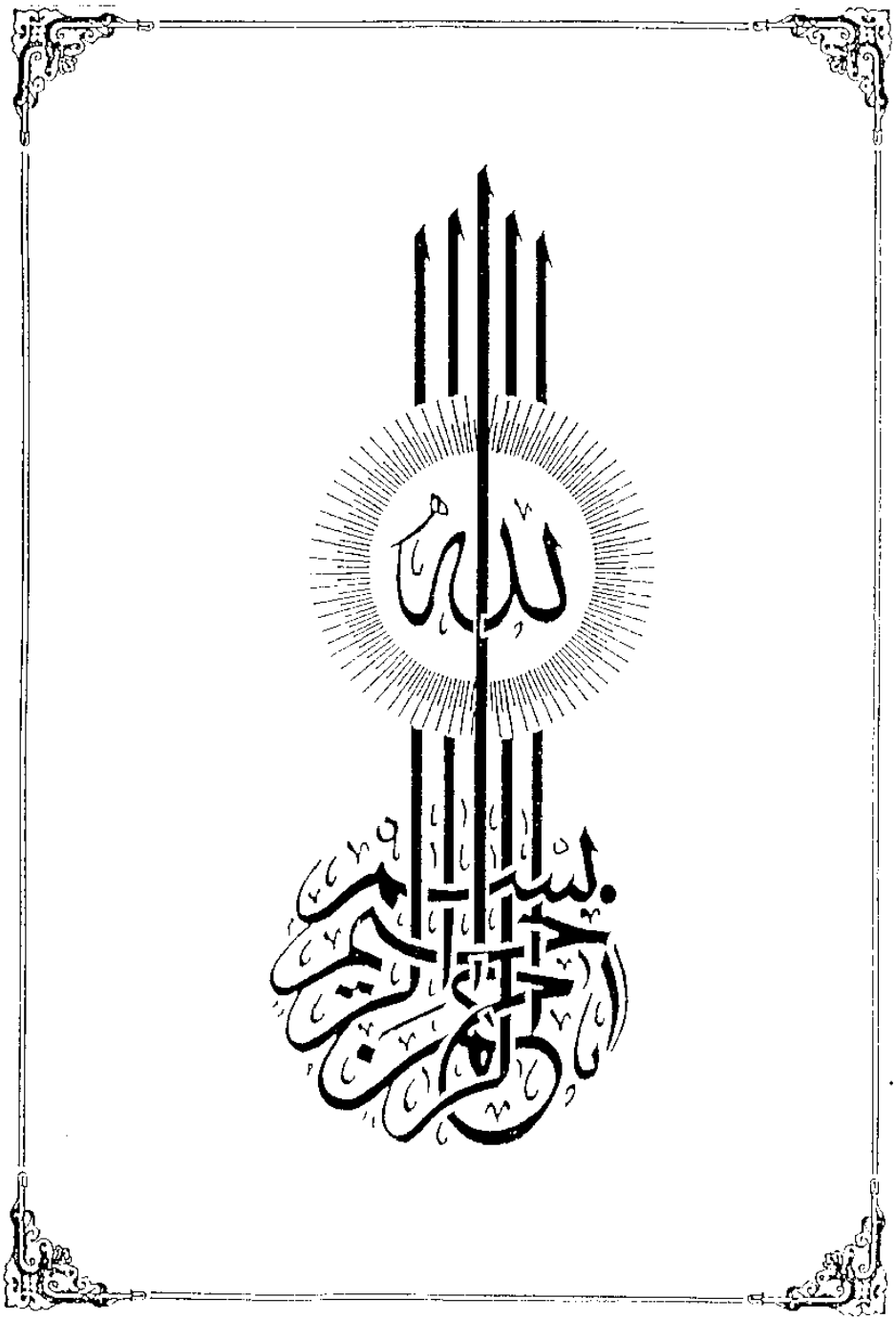

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INTRODUCTION

Introduction

Paralysis of one or both upper extremities occasionally follows the birth of a new born this is more common when the labour is complicated by obstetrical difficulties which necessitate focible manipulation or traction on the babies arm or head .
The condition is accordingly known as ' Obstetrical Brachial Plexus Palsies ' ' OBPP' .

Brachial plexus injury at birth still remains a significant problem with an incidence of 0.4-2.5 per 1000 live births , and in under developed countries reach 8 per 1000 (Jackson, et. al. 1988)
Sever reported no difference in occurance between boys and girls but found that the right upper limb was more frequently affected than the left because the former is usually delivered first (64%) LOA .

By referring to standard orthopaedic text books one become bewildered by the confusing variety of contradictory statments . Some are overly pessimistic , such as Turek , who states that "Generally the course is one of slow , gradual subsidence of the residual paralysis over several weeks to three or four months , after which further improvement is unlikely " . Sharrard on the other hand ; is quite optimistic , stating that "Some recovery in 75% of lesions of the upper part of the plexus and half of those with complete plexus paralysis" .

At the end of two years any residual paralysis may be able to be compensated by reconstructive surgery " .

He goes on to state that " Complete brachial plexus lesions in which no recovery occurs can not benifit from any reconstructive procedures . Because of uselessness , loss of sensibility , and shortening of the limb , the patient may well apt for amputation when he is an adolescent ." Duthie and Ferguson's text book states that " A minority of cases recover completely in three months and it is therefore impossible to determine clinically the exact extent of the lesion at an earlier date . In all cases of the upper arm , prognosis is good , but in the lower arm and whole arm type the restoratin of function is unlikely " . Almost all text books suggest that recovery in children with minor injuries can continue untill 18 to 24 months of age , whereas children with moderate to severe paralysis often are left with characteristic residual deformities .

Successful application of microsurgical techniques for reconstructive surgery of all types has stimulated several surgeons around the world to attempt direct repair of the brachial plexus lesion it self .
(Brown , K.L. 1987) .

ANATOMY

Anatomical considerations

Anatomy of the brachial plexus
(Last 1994)

Five roots contribute to the formation of the plexus for the upper limb .

They are the fibres that remain in the anterior rami of C5, 6, 7, 8 and T1 after these have given their segmental supply to the prevertebral and scalene muscles .

They divide into anterior and posterior divisions to supply the flexor and extensor compartments respectively , but before doing so , they unite to form three trunks in the following manner . The upper two roots unite to form the upper trunk , the lower two unite to form the lower trunk , and the central root runs on as the middle trunk . The five roots lie behind scalenus anterior muscle and emerge between it and scalenus medius to form the trunks which cross the lower part of the posterior triangle of the neck .

Each of the three trunks divides into an anterior and posterior divisions behind the clavicle . Here at the outer border of the first rib , the upper two anterior divisions unite to form the lateral cord , the anterior division of the lower trunk runs on as the medial cord , while all three posterior divisions unite to form the posterior cord . These three cords enter the axilla above the first part of the axillary artery , approach and

embrace its second part , and give off their branches around its third part .

The roots and trunks with their branches form the supraclavicular part of the plexus , with the cords and their branches forming the infraclavicular part .

The branches of the plexus consist of 3 branches from the roots and 3, 5 and 5 from the lateral , medial and posterior cords respectively .

The only exception to the 3, 5, 5 rule is in the branch from the trunks . It is only one , the Supra scapular nerve . from the upper trunk , in the posterior triangle .

Every where else in the plexus the number of branches follows the 3 , 5 , 5 pattern .

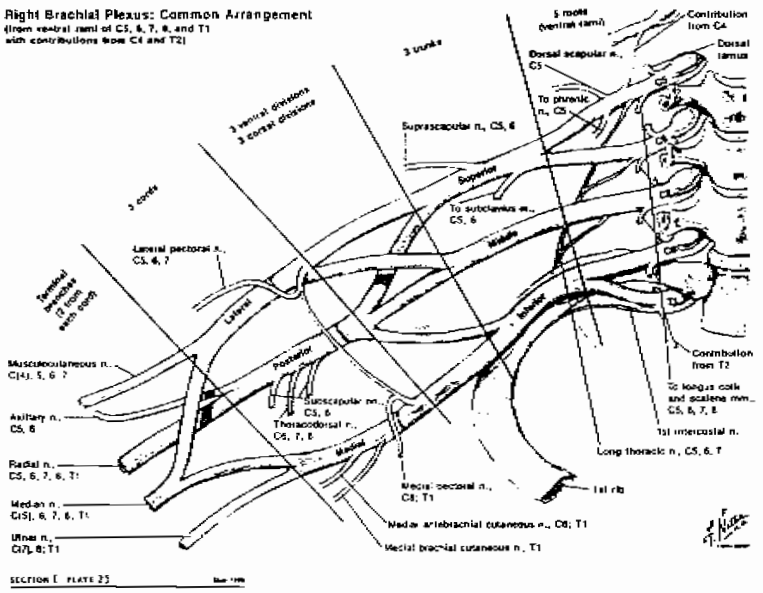

Fig. (1-1) : Right Brachial Plexus

I) Supraclavicular part

A) Branches from the roots .

i -Dorsal scapular nerve (Nerve to Rhomboids) :

Arises from the posterior aspect of C_5 , enters scalenus medius , appears at its posterior border , and courses down wards beneath levator scapulae , lying on serratus posterior superior . It is accompanied by the dorsal scapular vessels .

It supplies both Rhomboids on their deep surfaces and usually gives a branch to levator scapulae .

ii - Nerve to subclavius :

Arises from the roots of $C_{5,6}$ just as they combine to form the upper trunk (and is often classified as arising from the upper trunk) .

It passes down infront of the trunks of the subclavian vessels to enter the posterior surface of subclavius . It may carry some aberrant phrenic nerve fibres .

iii - Long thoracic nerve (Nerve to Serratus anterior) :

Arises from the posterior aspects of $C_{5,6,7}$ Branches from $C_{5,6}$ enter scalenus medius , unite in the muscle , emerge as a single trunk from its lateral border and pass

down into the axilla . On the surface of serratus anterior (the medial wall of the axilla) this is joined by the branch from C7 which has descended infront of scalenus medius . The nerve passes down posterior to mid axillary line and supplies serratus anterior muscle segmentally .

B) Branches from the trunks .

The solitary branch from the trunks (unless the nerve to subclavius is also considered to arise from the upper trunk) is the suprascapular nerve , which arises from the upper trunk in the lower part of the posterior triangle . It can be seen above the clavicle as a large nerve leaving the upper trunk and passing back and laterally to disappear beneath the border of trapezius .

It passes through the suprascapular foramen , beneath the transverse scapular ligament and supplies supraspinatus , descends lateral to the scapular spine with the suprascapular vessels and supplies infraspinatus and gives a twig to the shoulder joint .

II) Infraclavicular part

A) Branches from the lateral cord .

i - Lateral pectoral nerve : Pierces the clavipectoral fascia to supply pectoralis major with fibres from C5 , 6, 7 . It communicates across the axillary artery with

the medial pectoral nerve and through this communication supplies pectoralis minor . It has no cutaneous branches.

ii - Musculocutaneous nerve : Leaves the lateral cord , runs obliquely downwards and sinks into coracobrachialis , giving a twig of supply to it ($C_{5, 6}$) before passing through the muscle . Lower down it supplies biceps and brachialis and becomes the lateral cutaneous nerve of the forearm .

iii - Lateral root of the median nerve : is the continuation of the lateral cord ($C_{5, 6, 7}$) . It is joined by the medial root of the median nerve (from the medial cord (C_8 , T_1) , the two roots embrace the artery , and when the arm is pulled down to depress the shoulder may in some cases compress the vessel .

B) Branches from the medial cord .

i -Medial pectoral nerve : Arises from the medial cord (C_8,T_1) behind the axillary artery and enters the deep surface of pectoralis minor , giving a branch of supply before doing so , perforates the muscle , and enters pectoralis major , in which it ends by supplying the lower costal fibres . It is joined by a communication from the lateral pectoral nerve which passes across the axillary artery. Like the lateral pectoral nerve , it has no cutaneous branches .