سامية محمد مصطفى



شبكة المعلومات الحامعية

بسم الله الرحمن الرحيم



-Caro-

سامية محمد مصطفي



شبكة العلومات الحامعية



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم





سامية محمد مصطفى

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسو

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة يعيدا عن الغيار



سامية محمد مصطفي



شبكة المعلومات الجامعية



المسلمة عين شعور المسلمة عين شعور المسلمة عين شعور المسلمة عين شعور المسلمة ا

سامية محمد مصطفى

شبكة المعلومات الحامعية



بالرسالة صفحات لم ترد بالأصل



UPDATE ON MANAGEMENT OF PEDIATRIC BRACHIAL PLEXUS PALSY

An Essay Submitted For Partial Fulfillment of Master Degree in Orthopaedic Surgery and Traumatology

BY

AHMED NADY SALEH EL SAID

M.B.B.Ch,2003

Minia University Supervised by

Prof. Dr. Adel Anwar Abd El-Aziz

Professor and Chairman of Orthopedic Surgery and Traumatology., Faculty of Medicine, Minia University

Dr. Ahmed Saleh Abd El-Fattah

Lecturer of Orthopedic Surgery and Traumatology, Faculty of Medicine, Minia University

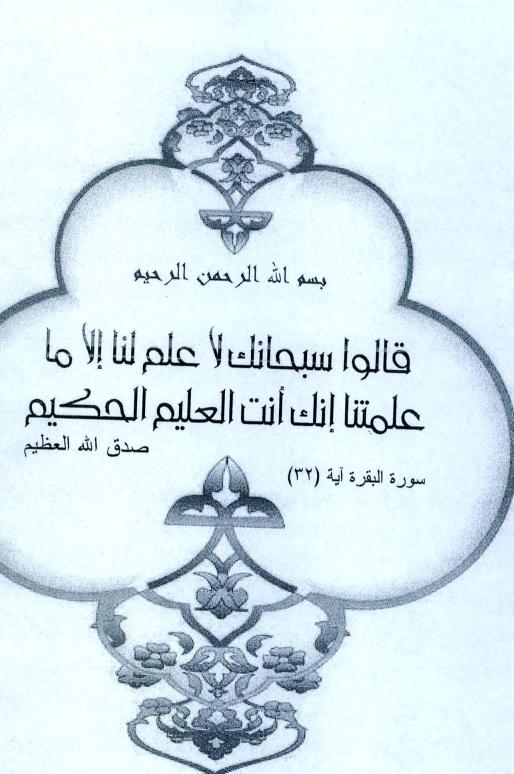
Dr. Ahmed Omar Yossef

Lecturer of Orthopedic Surgery and Traumatology Faculty of Medicine, Minia University

Faculty of medicine Minia university 2007

10871





BUNE.

t.

CONTENTS

Subjects	I	Page
Introduction & Aim of the Work		1
Anatomy		5
Etiology		34
Mechanism Of Injury	4	11
Classification	4	6
Diagnosis	5	6
Treatment	98	8
Summary and Conclusion	16	6
References	17	7
Arabic Summary		

Acknowledgement

First of all, my utmost gratitude is to **Allah**, The creator of all, for helping me to complete this work.

I would like to express my utmost gratitude to **Prof.Dr. Adel Anwar Abd El- Aziz,** Professor and Chairman of Orthopaedic Surgery and Traumatology, Faculty of Medicine, Minia University, for his willing assistance and continuous encouragement. I appreciate his patience and objectivity in tolerating the revision of this study.

I am too grateful to **Dr. Ahmed Saleh Abd El- Fattah**, Lecturer of Orthopaedic Surgery and Traumatology, Faculty of Medicine, Minia University, for his valuable advices and kind supervision.

My deepest gratitude to **Dr. Ahmed Omer Yossef** Lecturer of Orthopaedic Surgery and Traumatology, Faculty of Medicine, Minia University, for his kind supervision, generous help and unlimited support.

I would like to express my gratitude to all members of Orthopaedic Surgery Department, Minia University, for their great help, support and collaboration in performing this study.

I am also more than grateful to my family, especially to my father, **Prof.Dr. Nady Saleh El-Said** and my mother, for their support and encouragement allover times.

List of Figures

No		
1	Origin of brachial plexus and its roots, trunks. Cords and Propoles.	Page
2	Anatomy of the brachial plexus.	1
3	Cross-section of a spinal nerve root	5
4	Spinal nerves vertical axis angles	6
5	Lateral view of cervical spine	8
6	lateral view of the neck	9
7	The posterior triangle of the neck and axilla	14
8	Supraclavicular branches of the brachial plexus	16
9	Relationship of the nerves to bone structures and	17
<u> </u>	peripheral nerves and complex origin of the	22
10	the nerve supply to the entire arm and shoulder	24
11	Peripheral nerve fiber components	25
12	Nerve degeneration and regeneration	26
13	The complex nerve pathways within the brachial plexus	
14	The approximate fascicle distribution within the brachial player	28
15	Gross funicular distribution in a normal brachial pleyus	30
16	Shoulder position in relationship to maternal bony pelvis structures	$\frac{31}{27}$
17	Nerve roots protected from overstretch on the spinal nerve	37
18	Level of injury according to Narakas classification	41
19	A cable which resembles an avulsion nerve injure	47
_20	A cable which resembles a rupture of nerve injure	52
21	Various form of nerve injury	52
22	Infant with Erb's palsy.	53
23	Infant with total plexus palsy	55
24	Infant with Horner's syndrome	56
	Mallet system of measuring function at the shoulder	58
26	Left phrenic nerve injury and consequent paralysis of the left diaphragm	69
27	The meningocele appears to be at C8	80
28	The contrast medium leaked through a dural rent as far as the apex of the axilla	81
29	Normal roots	81
		82

MRI stretch injury to the brachial plexus showed meningoceles MRI stretch injury to the brachial plexus showed meningoceles Axial, sagittal, and coronal T2-weighted images demonstrate the presence of pseudomeningoceles Shoulder ultrasound Shoulder subluxation and shoulder dysplasia Algorithm for management of OBBP The infant position for operation Operative photograph showing patient's position in surgery and incision The skin incision for brachial plexus The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus Operative photograph of neurolysis An euroma-in-continuity involving the superior trunk The sural nerve grafts were harvested from both legs Use of fibrin glue with repair Use of fibrin glue with repair Intraoperative photographs shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla Intraoperative photographs direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair Intraoperative photographs direct end-to-end repair The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	30	Pseudomeningocele Avulsion injury	
MRI stretch injury to the brachial plexus showed meningoceles Axial, sagittal, and coronal T2-weighted images demonstrate the presence of pseudomeningoceles Shoulder ultrasound Shoulder subluxation and shoulder dysplasia Algorithm for management of OBBP The infant position for operation Presence of the plexus The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus Presence of fibrin glue with repair A neuroma-in-continuity involving the superior trunk Sural nerve grafts were harvested from both legs Intraoperative photograph shows exposure of the left third—fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair Intraoperative photographs direct end-to-end repair The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	31	CT myelogram	82
Axial, sagittal, and coronal T2-weighted images demonstrate the presence of pseudomeningoceles 34 Shoulder ultrasound 35 Shoulder subluxation and shoulder dysplasia 36 Algorithm for management of OBBP 37 The infant position for operation 38 Operative photograph showing patient's position in surgery and incision 39 The skin incision for brachial plexus 40 The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus 41 Operative photograph of neurolysis 42 A neuroma-in-continuity involving the superior trunk 43 Sural nerve grafts were harvested from both legs 44 Use of fibrin glue with repair 45 Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla 46 Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair 47 Intraoperative photographs direct end-to-end repair 48 The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) 50 Articular and solid elbow orthosis	32		83
Shoulder ultrasound Shoulder subluxation and shoulder dysplasia Shoulder subluxation and shoulder dysplasia Algorithm for management of OBBP The infant position for operation Operative photograph showing patient's position in surgery and incision The skin incision for brachial plexus The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus Operative photograph of neurolysis A neuroma-in-continuity involving the superior trunk An euroma-in-continuity involving the superior trunk Use of fibrin glue with repair Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair Intraoperative photographs direct end-to-end repair The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	33	Axial, sagittal, and coronal T2-weighted in	
Shoulder subluxation and shoulder dysplasia Algorithm for management of OBBP The infant position for operation Operative photograph showing patient's position in surgery and incision The skin incision for brachial plexus The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus Operative photograph of neurolysis A neuroma-in-continuity involving the superior trunk Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla Intraoperative photographs. Direct transfer of the distal accessory to the superaccapular nerve with microsurgical repair Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair Intraoperative photographs direct end-to-end repair The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	34	Shoulder ultrasound	85
Algorithm for management of OBBP The infant position for operation Operative photograph showing patient's position in surgery and incision The skin incision for brachial plexus The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus Operative photograph of neurolysis A neuroma-in-continuity involving the superior trunk Sural nerve grafts were harvested from both legs Use of fibrin glue with repair Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair Intraoperative photographs direct end-to-end repair The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	35		88
The infant position for operation The infant position for operation Operative photograph showing patient's position in surgery and incision The skin incision for brachial plexus The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus Operative photograph of neurolysis A neuroma-in-continuity involving the superior trunk Sural nerve grafts were harvested from both legs Use of fibrin glue with repair Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair Intraoperative photographs direct end-to-end repair The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	36		90
38 Operative photograph showing patient's position in surgery and incision 39 The skin incision for brachial plexus 40 The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus 41 Operative photograph of neurolysis 42 A neuroma-in-continuity involving the superior trunk 43 Sural nerve grafts were harvested from both legs 44 Use of fibrin glue with repair 45 Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla 46 Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair 47 Intraoperative photographs direct end-to-end repair 48 The infant's car seatas a means of providing some head stability 49 The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) 40 Articular and solid elbow orthosis	37	The infant position for operation	106
The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus 41 Operative photograph of neurolysis 42 A neuroma-in-continuity involving the superior trunk 43 Sural nerve grafts were harvested from both legs 44 Use of fibrin glue with repair 45 Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla 46 Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair 47 Intraoperative photographs direct end-to-end repair 48 The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	38		109
The normal anatomy, with attention to several anatomic "keys" helpful in locating the roots of the plexus 41 Operative photograph of neurolysis 42 A neuroma-in-continuity involving the superior trunk 43 Sural nerve grafts were harvested from both legs 44 Use of fibrin glue with repair 45 Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla 46 Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair 47 Intraoperative photographs direct end-to-end repair 48 The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	39	The skin incision for brachial player	109
Operative photograph of neurolysis 42 A neuroma-in-continuity involving the superior trunk 43 Sural nerve grafts were harvested from both legs 44 Use of fibrin glue with repair 45 Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla 46 Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair 47 Intraoperative photographs direct end-to-end repair 48 The infant's car seatas a means of providing some head stability 49 The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	40	The normal anatomy, with attention to govern	110
A neuroma-in-continuity involving the superior trunk 43 Sural nerve grafts were harvested from both legs 44 Use of fibrin glue with repair 45 Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla 46 Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair 47 Intraoperative photographs direct end-to-end repair 48 The infant's car seatas a means of providing some head stability 49 The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis		locating the roots of the plexus	113
Sural nerve grafts were harvested from both legs 43 Use of fibrin glue with repair 44 Use of fibrin glue with repair 45 Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla 46 Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair 47 Intraoperative photographs direct end-to-end repair 48 The infant's car seatas a means of providing some head stability 49 The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) 50 Articular and solid elbow orthosis		A neurono in a serie in includes	116
Use of fibrin glue with repair Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair Intraoperative photographs direct end-to-end repair Intraoperative photographs direct end-to-end repair The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis		Sural paragraph C	
Intraoperative photograph shows exposure of the left third-fifth intercostal nerves for transfer to the musculocutaneous nerve in the axilla Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair Intraoperative photographs direct end-to-end repair Intraoperative photographs direct end-to-end repair The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	 		
129 46 Intraoperative photographs. Direct transfer of the distal accessory to the suprascapular nerve with microsurgical repair 47 Intraoperative photographs direct end-to-end repair 48 The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	44		
46 suprascapular nerve with microsurgical repair 47 Intraoperative photographs direct end-to-end repair 48 The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	45		
Intraoperative photographs direct end-to-end repair The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	46	in the polarity Direct transfer C 1	
The infant's car seatas a means of providing some head stability The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	47	Intraoperative photographs direct end-to-end repair	
The postoperative function following nerve grafting for a C5 and C6 rupture(Erb's palsy) Articular and solid elbow orthosis	48	The infant's car seatas a means of providing some head stability.	
rupture(Erb's palsy) 138 Articular and solid elbow orthosis	40	The postoperative function C. II	138
50 Articular and solid elbow orthosis		rupture(Erb's palsy)	138
	50	Articular and solid elbow orthosis	130

LIST OF TABLES

No.	_ Itio	
1	Functional contribution of nerve roots	Page
2	Narakas classification of obstetric brachial plexus palsy	24
3	Raimondi (1993)'s classification defining hand function	48
4	Relation between different methods of classification	50
5		51
$\frac{3}{6}$	Differences between pre- and post-ganglionic injuries Key muscle groups and their corresponding nerve root levels	62
	The British medical research council (MRC)	63
	Full active movement of motion with gravity eliminated (muscle grade4)	65
8	must be achieved before active range against gravity is scored (muscle grade 5-7)	67
9	Gilbert and Tassin's muscle grading system	
10	Toronto scoring of motor power	70
	Narakas sensory grading system	71
11		72
12	Strategy for primary brachial plexus reconstruction	109
	Post operative management protocol	
14	Secondary reconstruction indications and methods	143

LIST OF ABBREVIATIONS

C: Cervical

T: Thoracic

OBPP: Obstetrical Brachial Plexus Palsy

BPI: Brachial Plexus Injury

RNA: Ribo-Nucleic Acid

MN: Median Nerve

MCN: Musculocutaneous Nerve

RN: Radial Nerve

AXN: Axillary Nerve

UN: Ulnar Nerve

PC: Posterior Cord

SSN: Supra-Scapular Nerve

DSN: Dorsal Scapular Nerve

LTN: Long Thoracic Nerve

MCA: Medial Cutaneous nerve of Arm

MCFM: Medial Cutaneous nerve of Forearm

SC: Subclvius muscle

TM: Teres Major muscle