DIPARTIMENTO MUSCOLO SCHELETRICO

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AN AUTOLOGOUSLY GENERATED PLATELET-RICH PLASMA MEMBRANE MAY ENHANCE PERIPHERAL NERVE REGENERATION

our experience since 2010

Pisa 2014 WORKSHOP " Ricerca e Innovazione Clinica"

Peripheral ***nerve surgery aims to restore structural and functional integrity of damaged neurons.***

Despite both surgical techniques and the understanding of nerve regeneration progressed a lot, in the last decades, severe lesions of major nerve trunks still impair functionality even after surgical neurorraphy.

NERVOUS TISSUE

SCARCE ***REGENERATIVE CAPACITY***

ONE OF ***THE SLOWEST REGENERATIVE PROCESS IN THE BODY***

THE SCAR ***FORMATION IS AN INEVITABLE RESULT OF SURGERY,RESPONSIBLE FOR INCOMPLETE RECOVERY***

EPINEURAL ***CONNECTIVE MAY AFFECT A MECHANICAL BARRIER TO AXONAL REGENERATION***

EXTRANEURAL ***SCARRING MAY LEAD TO THE ADESION OF NERVES TO ADJACENT TISSUE***

THEREFORE

REDUCING ***EPINEURAL AND EXTRANEURAL SCAR FORMATION MAY IMPROVE THE OUTCOME AFTER NERVE INJURY***

A SURGICAL ***REPAIR ASSOCIATED WITH THE USE OF BIOACTIVE FACTORS, REGULATING THE CONNECTIVE PROLIFERATION, CAN PERFORM AXOPLASMIC MIGRATION INTO THE DISTAL STUMP***

PRP

PLATELET-RICH PLASMA (PRP) IS DEFINED AN"AUTOLOGOUS" CONCENTRATION OF PLATELETS IN A SMALL VOLUME OF PLASMA

THE BIOACTIVE PROTEINS FOUND IN PLATELETS AND PLASMA CONTROL THE NERVE HEALING REDUCING THE SCAR FORMATIO AND SUPPORTING FIBER NERVE REMYELINATION

RELEASING
LARGE QUANTITIES OF GROWTH FACTORS (PRGs)
FRAGMENT COULD POLYMERIZE INTO PLATELET-RICH GEL WITH SCAFFOLDING EFFECT

OUR EXPERIENCE

MEMBRANE DIRECTLY IN CONTACT WITH THE NERVE

SEVERE COMPRESSION OF MEDIAN NERVE – VDC INEVOCABLE E/O THENAR ATROPHY

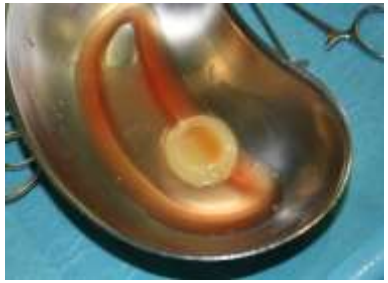
MEMBRANE SUTURED AROUND THE NERVE NEURORRAPHY AS " A GUIDE"

MEDIAN NERVE –ULNAR NERVE LESIONS IN HUMANS

MEMBRANE SUTURED AROUND IN A RAT SCIATIC NERVE MODEL.

SEVERE COMPRESSION OF MEDIAN NERVE

PREOPERATIVE CLINICAL APPEAREANCE



PRP MEMBRANE

INTRAOPERATIVE MEDIAN NERVE APPAEARENCE

PRP MEMBRANE POSITIONING

30 DAYS AFTER SURGERY

ESAME DI CONDUZIONE NERVOSA

Prof. Gabriele Siciliano

	MOTORIA				SENSITIVA			
	Ampiezza polso (mV)		Latenza distale (ms)		Ampiezza polso (µV)		VdC (m/s)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
PRP	2,6	3,5	8,07	5,74	0,42	5,85	1,65	24,08
	Var. 32%		Var. 29%		Var. ….		Var. ….	
No PRP	3,93	5,12	6,06	5,45	1,04	6,4	3,38	21,06
	Var. 30%		Var. 10%		Var. …..		Var. …..	
Significatività valori postop.	P = 0,39		P = 0,8		P = 0,79		P = 0,3	
Significatività valori pre/post operatori	Prp P=0,46		Prp P=0,15		Prp P=0,0006		Prp P<0,0001	
	NO Prp P=0,57		NO Prp P= 0,63		NO Prp P=0,01		NO Prp P=0,0032	

Prof. g

ULNAR NERVE LESION

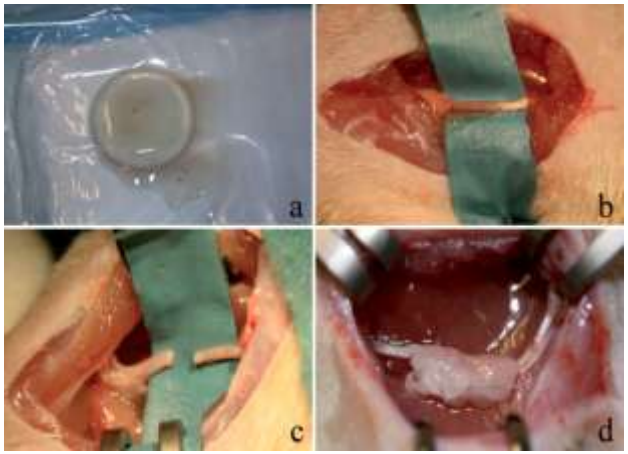
PREOPERATIVE CLINICAL APPEAREANCE

INTRAOPERATIVE ULNAR NERVE APPAEARENCE

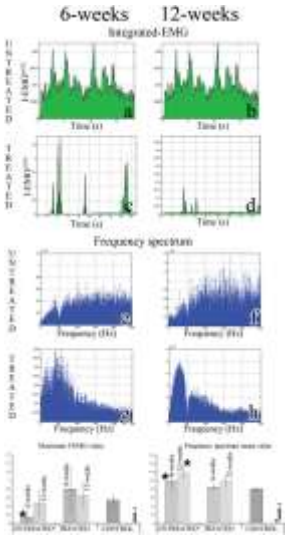
INTRAOPERATIVE ULNAR NERVE APPAEARENCE

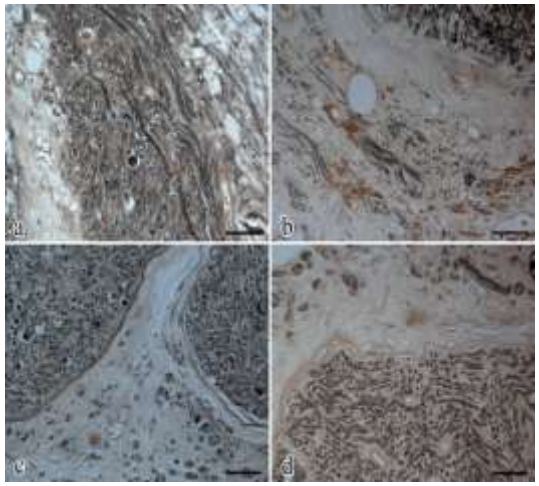
6 MONTHS AFTER SURGERY

RAT SCIATIC NERVE MODEL

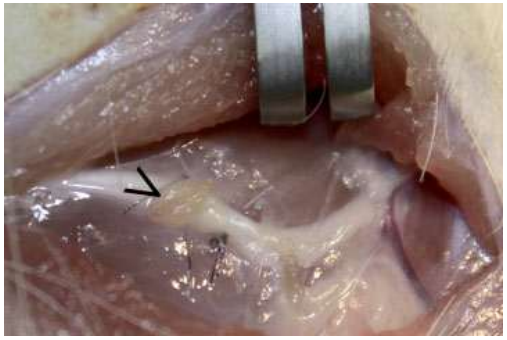


(a) Macroscopic appearance of the suturable platelet-rich plasma membrane; (b) exposed sciatic nerve; (c) sciatic nerve cross sectioned (d) appearance of the treated sciatic nerve





Histological appearance of the surgical area; (a) untreated nerve at 6 weeks; (b) untreated nerve at 12 weeks; (c) treated nerve at 6 weeks; and (d) treated nerve at 12 weeks. Osmium tetroxide impregnation, scale bar 50 µm.



Macroscopic appearance of the rat sciatic nerve at necropsy 6 weeks postsurgery from a treated animal. Still evident (arrowhead) the presence of platelet-rich plasma membrane residue.

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THE DAY AFTER …….

The mechanisms whereby PRP might improve tissue healing/ regeneration are still unclear, however

Our data in humans and in a rat sciatic nerve model show that the application of a PRP fibrin membrane around the neurorraphy improves the nerve regeneration process.

The use of PRP as a suturable or conctac membrane could perform an action not only as a source of bioactive proteins but also as a nerve guide to hold the scar reaction and thus improve axonal regeneration.

We should use PRP immediatly , but it is difficult

Thank for your attention