SPASTICITY AND SURGERY

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SPASTICITY

Motor disorder with hyperactivity of the muscles / hypertony

The SPASM Consortium

Assuming that all involuntary activity involves reflexes, spasticity is an intermittent or sustained involuntary hyperactivity of a skeletal muscle associated with an upper motoneuron lesion



In upper extremity most often Adductors Flexors Pronator

PRESENTATION

| Shoulder | adduction |
|----------|---|
| Elbow | flexion |
| Wrist | flexion/ pronation |
| Fingers | variable flexed/ hyperextended (swanneck) |
| Thumb | adduction / IP flexed |
| | |



http://www.xeomin.com/consumers/upper-limb-spasticity-adults/



Spasticity is Elective Elastic Variable

Modified Ashworth scale

0 No increase in tone

1 Slight increase in tone giving a catch, release and minimal resistance at the end of range of motion (ROM) when the limb is moved in flexion/extension

1+ Slight increase in tone giving a catch, release and minimal resistance throughout the remainder (less than half) of ROM

2 More marked increased in tone through most of the ROM, but limb is easily moved

3 Considerable increase in tone – passive movement difficult

4 Limb rigid in flexion and extension

/ Contracture

INDICATIONS FOR SURGERY

functioning vs non functioning

cave neglect



INDICATIONS FOR SURGERY

improvement of function hygiene/nursing/cosmesis

INDICATIONS FOR SURGERY

"failed" conservative treatment splint PT/OT Botox

TIMING

no improvement in motor/sensory recovery



CONTRACTURE VS SPASTICITY

Restore balance Reduce spasticity Release contracture Tendon transfer

CONTRACTURE VS SPASTICITY

Weaken spastic muscles Strengthen paretic muscles Stabilize instabile joints

RESTORE BALANCE



REDUCE SPASTICITY

selective neurectomy 2/3 of specific motor nerve branches

> LeClerq 2016 N 20 (8 stroke) HSN 63 muscles Ashworth scale reduced from 1.9 to 0.4 Patient satisfaction 6.9/10

REDUCE SPASTICITY



Figure 2: Microdissection of the 4 motor rami to the flexor carpi radialis atr the neuro-muscular junction, immediately before they enter the muscle.

RELEASE OF CONTRACTURE

intrinsic vs extrinsic contracture

detachment of origin

most often flexor of wrist and fingers medial epicondylar release

tenotomy

for wrist flexors

lengthening of the tendons

musculotendon junction / fractional or sliding in the tendon / z lengthening sublimus to profundus tendon



RELEASE OF CONTRACTURE

Arthrolysis Arthrodesis Joint stabilisation



Thumb in palm



Thumb in palm median neurectomy release strength FPB Matev Slide release of AP /FPB EPL rerouting





Swanneck



Swanneck

intrinsieke release lateral slip translocation



Swanneck

FDS sliptenodesis Arthrodesis



 $v_{\rm C} = V_{\rm m} \sin \omega t$ Vab =15(R+r)-5E -W-W-W $i_{\rm C} = I_{\rm m} \sin\left(\omega t + \frac{\pi}{2}\right)$ F(-2,4) $E_{n} = -13.6 Z^{-1}$ F= qvB sin O $I_1V_1 = I_2V_2$ ↑F8 I=0 +, V(-2,0) W=hfo \odot $P_m = I_m V_m$ F=qvXB $\cos \frac{A}{2} = \frac{1}{2} \frac{1+\cos A}{2}$ 2 Acetyl CoA+6H2O+ 2ADP +2Pi B Na2C03 $F = \frac{kQ_1Q_2}{r^2}$ Eff = P2 × 100% Log_m= Logm E=mC (Q1) $K = \overline{4\pi\epsilon_0}$ E,r Pm = I (X,Y) P2 P(x) Q(R) $= G(x) + \frac{R(x)}{Q(x)}$ $[p(x,y)] \equiv \forall x \forall y [\sim p(x,y)]$ \rightarrow (199) (-1,0) P2 Yi + Xn (b-a Yi) (0,-1) Δt 69 263 P 12H20 +34 ATP CC14 E0 = 8.8542 × 10 C/Nm2 5 r -11n2 2 Coenzyme A -> -> 2CO3 - 2NADT $r_n = 5.3 \times 10$ L. 2HODH+H -+ 4H $S = 2\pi mv \cos\theta$ cos BeH2 2 Acetyl Coenzy me A(C2) CuClz Sin qB SiC|4 Alz (504)3 NAD - FAD Cyt.b->Cyt.c->Cyt.a-O2 62 V=IR Parallelogram = bh D Si02 Cu20 A1203 S KI WIXI 1h MgC12 2C3H403+2C0 Geo2 b1 C, H120, + 602 + 38 ADP + 38 Pi 602+6420 + 38 ATP $\sum_{i=1}^{\infty} (x_i \cdot x_2)$ 502 $C_{L}H_{12}O_{L}+2ADP+2Pi \rightarrow 2C_{3}H_{4}O_{3}+2ATP+2NADH+H^{\dagger}$ No. C1207 Na2S Mn Oz NH4CI KMn04 KCI TALLU Mg(OH)2 CaO NaNO3 NH2 MgSO4 $H_2CO_3 \rightarrow H^+ + HOO_3^- H^+ + HCO_3^- \rightarrow H_2CO_3$ Zns ZnSO4 CO2 CO. + H.O H2CO3 HES P205 N20 XXXX N2 BC13 Na2504 Becla Zns 0 KX XX XX KX S NaCl TeF6 (H20) CHO 2CHO PC13 Zn 504 + 2GHO XX HX AI н 0 19 20 XX XX CLH ... 0 + 2 ADP + 2 Pi ENADH+H* 2NAD+ HCI Ö::c::Ö NCI3 2H+2e+ 02 -+ H20 PBr3 Ğ 24H + 60, + 34 ADP + 34 Pi

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