The Low Tone UE: Positioning and Treatment

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Triage for Early Extension & Abduction

Active finger extension is a strong predictor of short, medium, and long-term post-stroke recovery (Smania et al. 2007)

Minimal UE shoulder abduction & proximal motor control at admission to rehabilitation → "good" chance of regaining some hand capacity whereas patients without proximal arm control had a poor prognosis for regaining hand capacity (Houwink et al. 2013).

Patients with some finger extension & shoulder abd. on Day 2 → 98% probability of achieving some degree of dexterity at 6 months; Only 25% in those who did not show similar voluntary motor control.

60% of patients with finger extension within 72 hours had regained full recovery of upper limb function @ 6 months (Nijland et al. 2010).

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Causes of poor positioning in the low tone UE

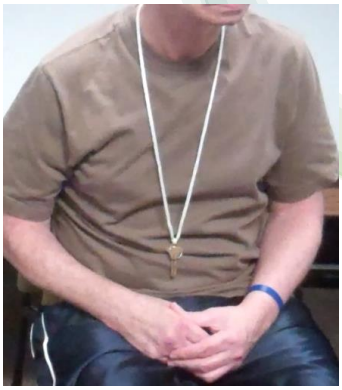
Poor postural stability

Neglect/ Decreased Proprioception

Flaccid/weak muscles (90%) + gravity

Learned nonuse → HABIT

Pain



Hypotonic shoulders are susceptible to **damage of the structures surrounding the shoulder**

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The Big Winner for Shoulder Pain?
Acupuncture/Acupressure

ACUPUNCTURE

- Multiple RCTs across approx. 500 subjects
- 3-5x/week for 2 wks.

ACUPRESSURE

- Similar effects and Level of Evidence but fewer RCTs

MOTOR FUNCTION

LoE	Conclusion Statement	RCTs	References
1b	**Acupuncture with herbal therapy** may produce greater improvements in motor function than **acupuncture.**	1	Seo et al. 2013

SPASTICITY

LoE	Conclusion Statement	RCTs	References
1b	**Acupuncture** may produce greater improvements in spasticity than **conventional therapy**	1	Mendigutia-Gomez et al. 2016

RANGE OF MOTION

LoE	Conclusion Statement	RCTs	References
1a	**Acupuncture** may produce greater improvements in range of motion than **conventional therapy**	2	Mendigutia-Gomez et al. 2016; Zhao et al. 2015
2	**Superficial needling acupuncture with club swing** may produce greater improvements in range of motion than **conventional therapy.**	1	Ni et al. 2017

PAIN

LoE	Conclusion Statement	RCTs	References
1a	**Acupuncture** may produce greater reductions in pain than **conventional therapy.**	2	Mendigutia-Gomez et al. 2016; Zhao et al. 2015
1b	**Acupuncture with herbal therapy** may produce greater reductions in pain than **acupuncture.**	1	Seo et al. 2013
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SLINGS AND OTHER AIDS
FOR SUPPORT AND POSITIONING:

Joint protection strategies - *used AT ANY STAGE of recovery* to prevent or minimize shoulder pain.

- Positioning and supporting the arm *during rest* [Evidence Level A].
- Protecting and supporting the arm *during functional mobility* [Evidence Level B].
- Protecting and supporting the arm *during wheelchair use or transfers* by using a hemi-tray or arm trough [Evidence Level B].

During the flaccid stage slings can be used **to prevent injury**; however, **beyond the flaccid stage the use of slings is controversial**.

Canadian Stroke Strategy

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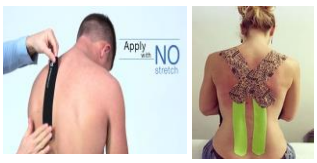
Posture *Before* Positioning or Rehab!



On Our YouTube Channel

ComfyBrace $23.99

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Pillows

PROS:
Abundant; Pliable; Many sizes; useful in side lying or sitting

CONS:
May not maintain or approximate appropriate shoulder position; Not useful while standing.

Variations:
pool noodles; wedges; NERF football,

Set aside 4-6 pillows in addition to what is available in the room

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Which sling…for support and transfers?
Hemi-Sling

WHAT:
Sling that supports UE across body and underneath elbow

PROS:
Abundant; Keeps UE across body during transfers; Good for patients w neglect; May assist w balance (1)

CONS:
Does not approximate position in humerus; May facilitate learned nonuse; deconditioning; poor arm swing

Alt: Fanny pack; Scarf

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Humeral "Cuff" Slings

WHAT: Humeral cuff that is held in place by adjustable straps, either around body or proximal to cuff.

PROS: Approximates humerus position; some allow UE swing; worn under or over clothes; adjustable; some allow distal UE use; Can integrate modalities with some types

CONS: limits shoulder mobility (e.g., external/internal rotation); tricky to don – requires practice!

Neurexa shoulder orthosis (Walmart)

Ali-Med Hemi Shoulder sling

OmoTrain shoulder brace

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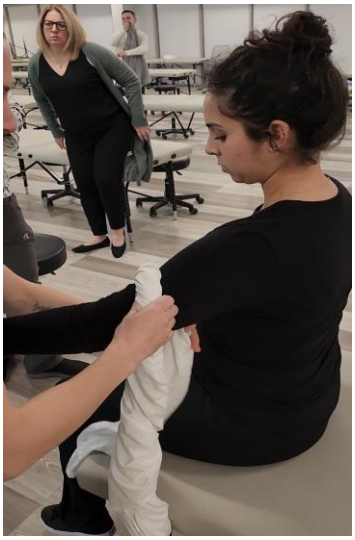
"Home-Made" Humeral Cuff "Sling"



Available on YouTube channel

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Distal Support Slings

WHAT: Supports UE distally; uses weight of the patient's forearm as a counterbalance to maintain positioning between the humerus and the shoulder joint (GH)

PROS: Approximates humerus in some pts; adjustable into EXTERNAL ROTATION; Can integrate modalities; unweights the UE; Distal activation?

CONS: May discourage arm swing; Arm swing changes may throw off balance; May not effectively approximate shoulder; May restrict distal UE use

Givmohrsling.com: ≈ $72.00

AliMed shoulder sling: ≈ $86.00

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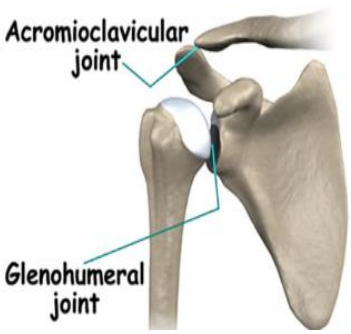
- **THERE'S BARELY A SOCKET!** Ball of the arm bone moves against a basically-flat surface on shoulder blade.
- **HUMERAL HEAD > 2X SIZE OF FOSSA**
- THE ONLY **BONE THAT CONNECTS** IS THE **COLLARBONE (SC JOINT)**
- **3 DEGREES OF FREEDOM** (the most in the body)



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Shoulder Subluxation Assessment

Excellent intrarater reliability (ICC=.980);
Moderate interrater reliability (0.79)

Cannot detect small sublux < .05 cm

Ultrasound: More sensitive (Kumar et al., 2011; Lee IS, et al., 2009; Huang et al., 2012)

There is a **weak correlation between size of sublux & fx;**
There is **no correlation between size of sublux & pain;**
Speed of UE recovery is associated w pain

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How About *Slings for Shoulder Subluxation?*

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	**Sustained positioning** may not have a difference in efficacy when compared to **conventional therapy** for improving motor function.	1	De Jong et al. 2006
1b	**Continuous passive range of motion exercises** may not have a difference in efficacy when compared to **self-directed range of motion exercise** for improving motor function.	1	Lynch et al. 2005

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	**Sustained or static positioning** may not have a difference in efficacy when compared to **conventional therapy** for improving spasticity.	3	De Jong et al. 2006; Ada et al. 2005; Turton & Britton 2005
1b	**Continuous passive range of motion exercise** may not have a difference in efficacy when compared to **self-directed range of motion exercise** for improving spasticity.	1	Lynch et al. 2005

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	**Sustained or static positioning** may not have a difference in efficacy when compared to **conventional therapy** for improving range of motion.	5	De Jong et al. 2006; Gustafsson & McKenna 2006; Ada et al. 2005; Turton & Britton 2005; Dean et al 2000

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SLINGS *FOR RESTORATION* (cont'd)

- Immobilization increases the risk of other pain syndromes including adhesive capsulitis and joint contracture and should be avoided (Dohle, 2013).
- May encourage flexor synergies, inhibit arm swing, contributing to contracture formation.
  - GIVE-MOHR: Good for maintaining arm swing; ADL participation???
- Slings are likely not beneficial for shoulder hemiplegia following stroke. (Ada et al., 2016; van Bladel et al., 2017)
- Ada et al, Cochrane Database Systematic Review: "There is insufficient evidence that to conclude whether slings and wheelchair attachments prevent subluxation, decrease pain, increase function or adversely increase contracture in the shoulder after stroke"
- Bladel et al., 2017, sling vs no sling, 6-week duration

"The control group (no sling) showed the least amount of shoulder subluxation. There were no significant differences between groups for pain, PROM, spasticity, or function between groups."

EBRSR: "Slings are likely not beneficial for shoulder hemiplegia following stroke"

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Electrical stimulation is effective for pain

ACUTE PHASE: Pain d/t **excessive stretches and associated damages to the soft tissues** (capsule, ligaments, and muscles)

CHRONIC PHASE: Pain due to **sustained, abnormal positioning**; **shortening of capsule and ligaments** and **possible muscle contractures**

Vafadar, *Biomed Res Intl;* 2015; Ada, *Aus J Phyiso;* 2002; Wang et al, *Am J PMR;;* 2000

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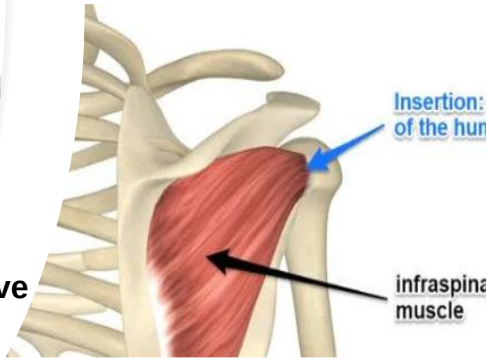
Where should I place electrodes?

- Posterior deltoid and supraspinatus
- **BUT** Cadaveric studies - the supraspinatus is not a powerful migrator **in some patients**
- Posterior deltoid and teres minor/infraspinatus **in some patients may be more effective**



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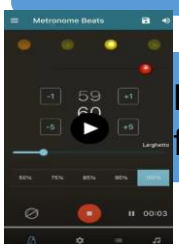
Functional/meaningful/avocational objects and/or activities at all points

No volitional movement? **Closed Chain/Active-assist/ISOMETRIC TOWARD A TARGET**

Grade up when **6-7/10** successful attempts



Feedback – cheering, videos, pictures, feeling, targets, **rhythm and anticipation**

"Metronome Beats"
https://stonekick.com/metronome.html

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Closed to Closed-ish Chain

"Football"

Towel w compelled wb

"Ergonomic Computer Wrist Extender"

POSSIBLE CHALLENGES WITH "TOWEL:"

- STAND/SIT?/TANDEM STAND?
- UE SUPPORT/NOT SUPPORTED?
- BEAT?/METRONOME?
- EYES OPEN/CLOSED?
- ANGLE OF INCLINE?
- SURFACE (slick?)
- BASE OF SUPPORT?

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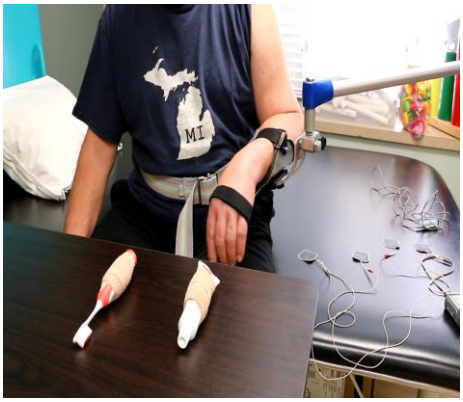
"Slide"



Mobile Arm Support (Saebo)
w. trigger-switch stimulation

POSSIBLE CHALLENGES FOR "SLIDE":

ANGLE OF INCLINE?
UE SUPPORT/NOT SUPPORTED?
RESISTANCE? HARD STOP?
SURFACE (slick?)
BEAT?/METRONOME?
EXTERNAL/INTERNAL ROTATION

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Mobile Arm Support Suggestions ("Gravity Compensation")

"Gravity compensation facilitated active arm movement excursions without impairing motor control…"
- Prange et al *Neurorehabil Neural;* 2009

Saebo MAS ($7k)

PVC Platform w theraband and annoying children

www.amazon.com
$18.98

Thanks to:
Allora Bellanger, PT, DPT, CSRS
TIRR Memorial, Houston

Tie a theraband to a doorknob, drape it over the top of the door, tie to patient wrist

Items with the word "boom" (mic stand)

Krabben et al, *J Neuroeng Rehabil*; 2012;
van der Kooj et al, *Ann Int Conf Eng Med Biol Soc* 2009

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Sitting balance progression

What muscles will she use?

Ipsalateral anterior nonparetic

Ipsalateral posterior nonparetic

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Sitting balance progression

How can I increase challenge?
(eg, change height of chair)

Ipsalateral anterior nonparetic

Try to attain trunk flexion;

Push back against your hand as they return to extension

Ipsalateral posterior nonparetic

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Sitting balance progression:

Stabilize @ the elbow and wrist →
A <u>single functional unit:</u> forced activation through the shoulder

Contralateral anterior paretic

Contralateral posterior paretic

IMAK Pillo Splint

LQO Adult Elbow Fixation stabilizer

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Progress to sidelying

High-low table

Shoulder flexion, Gravity eliminated

"PUSH UP/DOWN TOWARD YOUR HEAD/DOWNTOWARD YOUR FEET!" (Shoulder flexion/extension)

Gravity Compensation w. proximal/distal support

Elbow flexion, Gravity eliminated

"PULL IN!" (Elbow flexion/extension)

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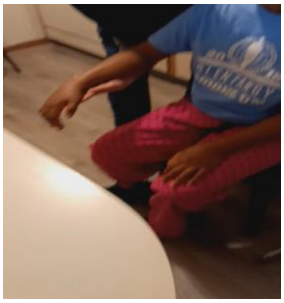
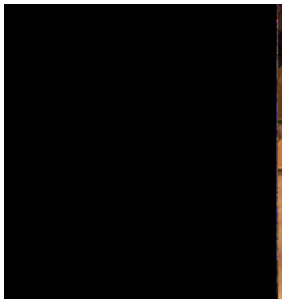
How Do I Know If The Muscles Are “Activating?”

Look;
Palpate;
Portable sEMG device (lab)

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Upgrading or Downgrading?

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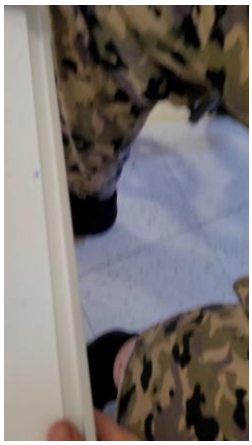

Open → More Closed-Chain & More Proximal

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QUESTIONS?

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