



# SERIAL CASTING

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# Objectives

- Describe the purpose of serial casting as it relates to a variety of neurological diagnoses
- Discuss the various approaches to serial casting
- Name the various considerations of casting and recognize the importance of client education
- Recognize the various treatment adjuncts to serial casting
- Discuss post-cast management

# What is serial casting?

- Serial casting is a series of casts that are applied to a joint with a low load, continuous stretch to improve functional use of an upper or lower extremity.



# Benefits

- Non-invasive
- Targets a specific body part
- Draws attention to a neglected limb
- Cost
- Can help fit for orthotics



# Disadvantages

- Time consuming
- Takes 2+ people
- Complications
- Prevents active use of casted extremity
- Interrupts other programs

# Job Duties

## Caster-

- Primary roles include:
  - Utilization of casting material in order to create an effective cast based on splinting purpose and goals
  - Preventing complications/errors in casting

## Holder-

- Primary roles include:
  - Maintaining ideal joint(s) positioning at submaximal
  - Give feedback to the caster throughout the process
    - Client needs break
    - Spasticity is changing
    - Gaps in casting material
    - Preventing complications/errors in casting

# What are the goals of serial casting?

- Reduce spasticity and/or abnormal tone
- Prevent and reduce contractures
- Increase AROM/PROM
- Facilitate proper positioning
- Regain functional use of an extremity & management of care
- Pain reduction as a secondary goal

# Frequency & Duration

- Series of 5-7 casts
- 3-5 days at a time
- Each time a cast is removed, time is spent stretching the newly gained ROM before another cast is reapplied that same day (provided no complications)





# Approaches to Serial Casting

1. Biomechanical
2. Neurophysiological



# Biomechanical Approach

- ROM focused
- Goal: prevent/reduce contractures
- Collagen change
- Sarcomere change



# Neurophysiological Approach

- Focus is on inhibition overall (inhibiting/ decreasing spasticity is key)
- Muscle spindle change
- Inhibitory approach
  - Prolonged stretch
  - Neural warmth
  - Resets muscle spindle

# Considerations

- Patient/family goals
- Team goals
- Patient tolerance
- Level of cognition
- Safety to self and others
- Upcoming medical procedures/needs



# Precautions

- Skin integrity
- Behavior
- Sensation
- Circulation
- Edema
- Cognition
- Upcoming medical procedures
- Heterotopic Ossification
- Arthritis
- Wounds
- Shoulder stability

# Contraindications

- Fractures
- Deep Vein Thrombosis (DVT)



# Pre-Casting Decisions

- Clear all precautions and contraindications
- Prioritize based on functional needs
- Type of cast
- What material is most appropriate?



# Assessment Tools

- PROM
- AROM as appropriate
- Skin checks
- Muscle tone: Modified Ashworth Scale & Modified Tardieu for inhibitory casting
- Reflexes for inhibitory casting
- Functional use scales/tasks as appropriate



# Types of Material

## ○ **Fiberglass**

- + Lightweight
- + Excellent strength/rigidity
- + Good durability
- + Fast drying time
  - More expensive than plaster
  - Sharp edges
  - Shrinks after drying

## ○ **Plaster**

- + Inexpensive
- + Conformable
- + Easy to work with for difficult hand placements
- + Good strength
- + Can reinforce easily with more plaster
  - Messy to work with
  - Long drying time
  - Heavy
  - Smelly

# Treatment Adjuncts to Serial Casting

- Oral medications
- Botulinum toxin type A
- Motor Point Blocks
- ITB pump
- NMES
- Taping

# Oral medications

- Baclofen= most common
- Systemic, not specific
- Sedating effects
- Strong support and evidence of decreasing tone when used with casting

# Botox

- Purpose: impair function at the muscle level by a direct injection into the muscle
- Lasts 3-4 months
- Peak effect is 2-3 weeks
- Maximum amount allowed not enough for larger muscles

# Botox

- 2004 study: Glanzman, Kim, Swaminathan, Beck
  - Children with spastic equinus contractures
  - 3 groups:
    - Casting with Botox
    - Casting without Botox
    - Botox injection only
  - Significant difference with both casting groups
  - No difference with Botox only
    - **Except** that the Botox only group led to an early return of spasticity compared to the other groups

# Motor Point Blocks

- Purpose: impair function at the nerve/motor point via injection of a chemical
- Phenol alcohol
  - Nerve block
  - Motor point block
  - Very inexpensive compared to Botox

# ITB Pump

- Internally placed
- Provides steady doses of Baclofen directly into intrathecal space of spine
- Used for severe spasticity
- Systemic response
- Requires surgical placement and ongoing management
- No direct literature on pump and UE casting

# NMES

- Purpose: activate and strengthen inactive muscles, provide sensorimotor input- no direct literature on this
- Inhibit agonist muscle with a dynamic cast
- Excite antagonist muscle with NMES





# Taping

- Purpose: edema control or joint positioning
- Joint positioning= leukotape
- Edema control or inhibition/activation= kiniesiotape



# Post Cast Management



# When to conclude the casting plan?

- When goals are met
- When 5-7 casts have been used
- If it becomes detrimental to the client's well being
- If 5-10 degrees of ROM have not been achieved over 2 casts
- If spasticity has not decreased over 2 casts
- If volitional movement has not increased over 2 inhibitory casts

# Management between casts

- Check skin integrity
- Redo outcome measures
- Wash area with soap and thoroughly dry
- Allow 10-20 minutes of bending/ROM (can use heat)



# Bi-Valving

- Made from a cast that has been on the limb for 2-5 days
- Last cast in series
- Adjunct therapy
- Benefits: hygiene, skin needs, allows for periods of active motion
- Does not increase ROM
- Main reason for noncompliance is improper fit



# Bi-valving continued

- Maintains ROM better than manual stretching and positioning (Moseley et al., 2006)
- Fabricate at submaximal range to ensure comfort
- Ask yourself:
  - is the ROM submaximal?
  - does it fit?
  - is it secured with tape?
  - is the strapping secure?
  - are the sides marked to match and correctly align?
  - are the top and bottom clearly labeled?
  - is the correct extremity labeled (R vs. L)?



# Splinting

- Alternative to bi-valving
- Pros: washable, don't have to be custom made
- Must be available immediately after last cast is removed
- Casting will be unsuccessful if not splint or bivalve

## Consider:

- + Can this splint maintain the ROM gained?
- + Can the skin tolerate use?
- + Does it align with post-casting goals?



# Before/After



\*After 5-6 casts worn 3-5 days each





QUESTIONS?

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