



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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