Infantile Scoliosis Outreach Program

EARLY TREATMENT PRINCIPLES

For Mehta EDF Casting

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Early Treatment Principles

1. Mehta/EDF Casting Overview

First hands-on, Early Treatment Trial project (ETTP). Shriners Intermountain Hospital, May 2005

Mehta/EDF casting is an effective, conservative treatment developed for infantile and early-onset scoliosis (EOS), with over 20 years of positive published evidence in world-renowned pediatric spine studies. A series of plaster casts should be applied early, during infancy or early childhood (generally under and around 2 years of age), to achieve maximum effectiveness. Correction of the spine is driven by the child's own unique growth rate.

Human growth is most rapid during the first two years of life—approximately 24 cm—compared to the next major growth phase during adolescence, which averages about 14 cm. This powerful early growth can be harnessed to guide the young spine to de-rotate and grow straighter with each properly applied EDF cast.

All progressive curves begin small and increase during periods of rapid growth. A bent and rotated spine will continue to progress alongside that growth if left untreated.

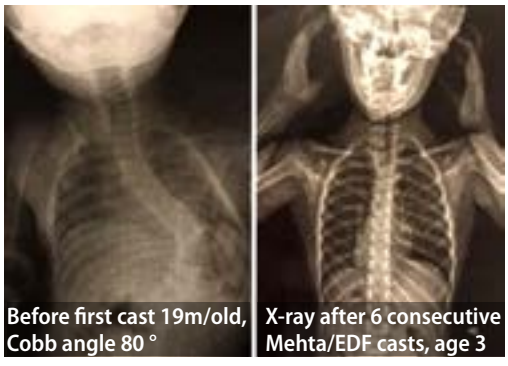
Approximate Mehta/EDF Casting Timeline:

- Under 2 years old: Casts applied every 2 months
- 3 years old: Casts applied every 3 months
- 4 years old: Casts applied every 4 months
- 5–10 years old: Casts applied every 4 months

Because every child's growth rate is unique, these age-based intervals are approximate and may be adjusted as needed.

Once the diagnosis is confirmed by X-rays, an experienced Mehta/EDF casting physician will schedule the first cast without delay. The sooner the casting process begins, the sooner the corrective process can take advantage of the child's rapid growth.

2. X-Ray Monitoring for EOS



Before first cast 19m/old, Cobb angle 80 °

X-ray after 6 consecutive Mehta/EDF casts, age 3

EOS is monitored using standard X-rays. Many hospitals now utilize low-dose X-ray technology, and radiation exposure is no longer considered a significant concern when repeated imaging is clinically necessary.

One X-ray on a standard machine is often compared to spending an eight-hour day in the sun.

For non-ambulatory infants, X-rays must be taken in the supine (lying down) position with the arms at the sides, not raised above the head. For ambulatory toddlers and young children, X-rays must be taken in a standing position, again with the arms positioned at the sides and not overhead.

Raising the arms above the head can make scoliosis appear less severe than it truly is and does not provide an accurate representation of the curve. X-rays taken out of the cast are the most accurate, as the spine appears artificially straighter while in the cast. A cast-free period of approximately 48 hours prior to X-ray

imaging is recommended if logistically feasible to allow for an accurate measurement. A caveat to these guidelines exists in the most severe cases. Severe rotation can regress extremely quickly, necessitating reapplication of the cast within 24 hours to avoid losing precious ground.

(Taking X-rays in the same position is necessary for accurate, comparative evaluation.)

Additional Diagnoses to Consider in Early-Onset Scoliosis:

- Tethered cord & Chiari malformation. See symptoms here: https://bit.ly/3Q7SA0j
- A full brain and spine MRI/CT is necessary to properly diagnose and treat these conditions.

3. Curve Measurement and Progression Assessment

EOS is evaluated using Cobb angle and rib–vertebral angle difference (RVAD) measurements. Both measurements can be obtained accurately on standard X-rays using a simple pencil and ruler and remain the preferred and most reliable methods for assessing curve progression or resolution in growing spines.

A Cobb angle measuring approximately 25–30 degrees or greater is considered progressive. In these cases, early Mehta/EDF casting should begin without delay to achieve optimal results.

RVAD is a predictive measurement used to help determine whether a curve is likely to progress or self-resolve. **The RVAD measures rib orientation relative to the spine, not spinal rotation.** An RVAD greater than 20 degrees is considered progressive. An RVAD less than 20 degrees is generally considered self-resolving, and treatment is typically not required.

Rotation is also measured most accurately by pencil and ruler and is the preferred method used by experienced growing spine specialists. It is measured in three phases—1, 2, and 3—with Phase 3 being the most severe.

4. Casting Equipment and Three-Dimensional Correction

Mehta/EDF casting must be performed on a specialized casting frame capable of providing true three-dimensional correction and employing all three essential corrective components:

1. Elongation
2. De-rotation
3. Flexion

Elongation, manual Derotation and Flexion to correct the growing spine gently by a proven and conscientious approach.

Elongation of the vertebral column, achieved using appropriate EDF casting equipment, provides gentle and controlled traction that assists in stretching and straightening the affected vertebrae. This traction opens intervertebral disc spaces, which is a necessary precursor to effective manual de-rotation. Maximizing disc space safely and gradually is essential to achieving optimal spinal correction.

De-rotation of the child's small vertebrae is the key component of the Mehta/EDF process. A properly constructed EDF casting frame is critical, as it provides adequate access and positioning for the lead surgeon to manually de-rotate the vertebrae while allowing the clinical team to maintain all required safety measures throughout the procedure.

[Comment by Jacques D'Astous, MD (FRCS(C))] *EDF casting must be performed on the specialized casting frame. The patient is under constant traction and flexion of the hips. The de- rotation occurs because we press up on the ribs on the convex side of the curve while the assistant presses down on the ribs on the concave side of the curve. While this is not direct derotation of the vertebrae, it is a secondary maneuver which produces some derotation of the vertebrae as measured on the post-casting x-ray. How to do this is well described at the end of section 3.*

Flexion, the third corrective component, is used to correct and control lumbar lordosis. Flexion is achieved by supporting the patient's legs and feet in stirrups on casting equipment specifically designed to provide this capability.

During casting, children under anesthesia are connected to multiple medical supports, including masks, tubes, wires, and monitoring equipment. Repeated patient transfers between a cast preparation table and separate casting equipment—particularly while intubated and within the confined space of a small operating room—introduce unnecessary risk.

Modern Mehta/EDF casting can be performed entirely on a single, purpose-built frame. This allows cast preparation, anesthesia maintenance, application, and trimming to be completed safely and efficiently without transferring the patient.

Large, modified adult casting frames and pediatric hip frames must be adapted to include both elongation and flexion capabilities. Without these essential components, proper EDF application is not possible.

A proper pediatric EDF casting frame provides the ability to treat this time-sensitive and complex condition three-dimensionally, safely, and without compromising quality of care.

Do not settle for less.

ISOP's 3rd hands-on training conference, Shriners Chicago 2007.

5. The Mehta/EDF Casting Team

Successful Mehta/EDF casting requires a coordinated team of dedicated, experienced, and well-organized professionals. This team typically includes the lead surgeon, anesthesiologist, operating room nurses, cast technicians, and orthotists.

Because the operating room is a confined space filled with essential equipment—such as anesthesia machines, tubing, monitoring wires, electrical cords, supply carts, and imaging systems—a pre-arranged plan tailored to each child's unique EOS presentation is critical. Careful planning helps minimize the young patient's time under anesthesia and ensures a safe and efficient procedure.

An experienced and well-coordinated Mehta/EDF casting team can typically complete a cast application in approximately 1.5 to 2 hours.

Mehta/EDF casting is considered labor-intensive. The more streamlined and effective the process is—supported by proper equipment and a prepared, skilled team—the more likely physicians are to perform Mehta's specialized EDF casting safely and repeatedly for young patients with scoliosis.

6. Anesthesia for EOS

Anesthesia is a requirement for Mehta/EDF casting candidates for a myriad of reasons. Three examples

include:

1. It allows the young patient and spine to relax completely during the Mehta/EDF casting process.
2. It prevents medical trauma associated with cast application preparation and procedure, including IVs, masks, blood pressure cuffs, tape removal, trimming, operating room sounds, and unfamiliar medical staff.
3. It permits the casting team to perform the procedure in a calm environment.


Anesthesia is a requirement for Mehta/EDF casting.

7. Casting Materials: Plaster vs. Fiberglass

Mehta/EDF casts are made of plaster of Paris due to the material's superior molding capability. Dr. Mehta, European EDF casting pioneers, and experienced American Master Caster's consistently prefer plaster for its superior moldability, its friendliness to skin, and its overall effectiveness at maintaining correction.

Moldability is of critical importance when applying casts to correct spinal curvatures in young, flexible patients. Fiberglass is more rigid and does not mold or hold corrective forces as effectively as plaster. Additionally, fiberglass has been associated with a higher incidence of skin complications. Skin issues can interrupt the casting schedule and delay the next cast in the corrective process.


Severe skin compromise under a fiberglass cast with experimental liner

A temporary pause in water-based activities is not detrimental to a young child's development. At this early age, children do not retain long-term memory of the casting experience.

Waterproof casting systems are fiberglass-based and rely on various liners that are still considered experimental. These synthetic liners are hard on fragile skin and do not constitute true Mehta/EDF casting.

8. Types of Mehta/EDF Casts

Mehta/EDF casting in the United States currently utilizes two primary cast types. The original Mehta/EDF cast is the over-the-shoulder design, which addresses curves in all spinal locations, including high thoracic curves above T7. This was the original method taught and remains the only option capable of treating high thoracic involvement and all curve locations simultaneously.

Following ISOP's second training conference, a modified underarm cast became more widely used in the United States. Underarm casting is now the most commonly applied style due to a higher incidence of lumbar scoliosis and parental concerns related to over-the-shoulder casts—particularly those applied with improperly positioned, excessively high shoulder straps.

Improper shoulder straps, sometimes referred to as "handlebar straps," can contact the patient's ears and restrict full head rotation. Properly applied shoulder straps are positioned low, do not interfere with head movement, and do not cause discomfort.

Further studies evaluating the effectiveness of properly applied over-the-shoulder Mehta/EDF casts are warranted and should not be discounted for children with high thoracic curves.

9. Pelvic Fit and Mehta/EDF Cast Anchoring

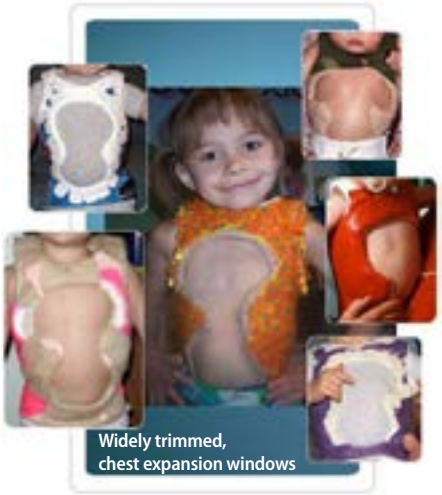
Mehta/EDF casts are designed to fit snugly and comfortably around the pelvis. Proper pelvic fit is essential to hold the correction attained by the elongation process and helps preserve overall de-rotation and flexion correction. A well-applied cast extends over the pelvis to cover the hip bones. The iliac crests serve as the cast's primary anchoring points and are critical for maintaining correction throughout the casting interval.

10. Therapeutic Windows in Mehta/EDF Casting

Mehta/EDF casting employs two essential therapeutic windows that are required components of effective treatment.

A. Anterior (Front) Window

A large, mushroom-shaped window is trimmed in the front of the cast to allow full chest expansion for comfortable breathing. This widely trimmed anterior window was designed to prevent chest wall deformities and is a required element of the Mehta/EDF process.



Widely trimmed, chest expansion windows

Rib flaps may be trimmed to support flexible, non-ossified ribs and can help prevent permanent rib flare in children requiring prolonged casting.

A widely trimmed, large front window is suggested to help prevent potential choking hazards by allowing parents access to perform the Heimlich maneuver.

B. Posterior (Back) Window

Derotation windows trimmed for siblings

A D-shaped window is trimmed in the back of the cast according to the curve pattern and should not extend past the spinal midline. This window serves three critical purposes:

- Improved breathing comfort
- Facilitation of vertebral de-rotation at the apex of the curve
- Accommodation of normal bodily functions such as coughing, vomiting, sneezing, and eating

The posterior D-shaped window allows the flattened ribs on the concave side of the curve to expand outward with each breath, while the convex ribs are molded flatter, helping reduce kyphotic deformity. These specialized windows do not compromise cast integrity and can be easily trimmed by the lead surgeon or experienced operating room staff during the intraoperative phase.

11. Intraoperative Mehta/EDF Cast Trimming

Mehta/EDF casts are trimmed in the operating room to ensure comfort, mobility, and hygiene. The cast is trimmed in the front above the legs to allow comfortable sitting. It is also trimmed under the arms to promote comfort and preserve full range of motion. In the back, it is trimmed above the gluteal crease to maintain hygiene.

Proper trimming is required prior to hospital discharge to allow comfortable travel home and prevent an unnecessary return to the hospital.

Oscillating Saw Tool

12. Use of Anti-Microbial T-Shirts


Seamless, anti-microbial undershirts

Mehta/EDF casts are applied over an anti-microbial, seamless T-shirt, which serves several important functions:

A. Acts as a protective buffer between the plaster cast, cotton stockinette, and the child's fragile skin.

B. Assists with hygiene management following urine or fecal accidents. The shirt can be gently stretched out from the cast, washed with antibacterial soap and warm water, and dried thoroughly using a blow dryer on a cool or slightly warm setting before being repositioned smoothly back inside the cast.

Removal or replacement of the T-shirt must be discussed with the treating surgeon in advance. Some physicians allow T-shirt replacement, while others do not. Padding may also be added over bony prominences to enhance comfort and correction. Because internal padding cannot be replaced once applied, consultation with the physician prior to any shirt removal is essential.

13. Casting Series and Treatment Continuity

Mehta/EDF casting was developed as a continuous series of corrective casts with minimal interruptions. Dr. Mehta did not allow cast breaks unless medically necessary, such as for skin breakdown or illness that precluded anesthesia.

Extended breaks from casting are not recommended for young patients who have the potential for complete resolution. When the cast is removed, flexible vertebrae will regress toward their original deformity if full de-rotation has not yet been achieved. Loss of correction during cast breaks often necessitates additional casts to regain progress.

Early treatment is time sensitive. Losing valuable periods of rapid growth while out of cast is not advised when complete resolution is the goal.

Longer cast breaks may be appropriate for older patients who have missed the window for cure and are using casting primarily to manage progression and preserve growth time.

14. Correction Plateaus

It is common for patients to experience a temporary correction plateau during a series of well-applied Mehta/EDF casts. The precise reason for these plateaus is not fully understood. During this time, soft tissues and ligaments are being retrained, and muscles are relearning proper alignment and memory.

ISOP has observed that many children continue to improve after experiencing a temporary plateau. Families who elect to continue casting through this phase often achieve better long-term outcomes.

15. Casting to Preserve Growth Time in Older Patients

Mehta/EDF casting is also an effective method for preserving growth time in older patients who have missed the curative window and have significant curves. Delaying the premature placement of spinal hardware has been shown to reduce overall post-surgical complication rates.

One effective strategy is to alternate Mehta/EDF casting during winter months with a well-fitted brace during the summer. This seasonal approach allows older children to participate more fully in normal activities while continuing conservative management. Alternating between casting and bracing has been a successful method for delaying surgery—often by years—since 2005 in America for nonstructural cases.

16. Growth Modulation for Congenital (Structural) Cases

Mehta/EDF casting is an effective conservative option for externally modulating growth in many children with congenital scoliosis. In these situations, casting is used to control curve progression, preserve spinal and thoracic growth, and delay or reduce the need for early surgical intervention.

17. Cast Edge Protection and Comfort

Cast edges are most comfortable for the patient when all edges are taped, underneath and over the surface by one inch or more, using moleskin. Proper edge covering serves several important purposes:

- Protects skin integrity
- Enhances comfort
- Supports hygiene

Pre-cut Moleskin petals provided by the hospital

Requesting extra pre-cut moleskin "petals" from the hospital prior to discharge is strongly recommended.

Experienced parents of infants and younger children have found that placing a panty liner smoothly under the front and back portion of the cast and securing it over the top edge has been helpful in wicking up accidents and keeping skin and the cast clean.

18. Cast Coverings and Finishing Options

Mehta/EDF casts decorated with Tacky glue, Mod Podge and pre-cut cotton fabric pieces to represent various holidays

Mehta/EDF casts are typically covered with a light outer layer of fiberglass. Because fiberglass is highly rigid and may be harsh on fragile skin, some hospitals prefer to cover it with Coban as the outer covering. Other facilities allow parents to decorate the cast at home using colored or patterned duct tape or cotton fabric sealed with Mod Podge.

19. Skin Care

Skin issues are the most common complication with Mehta/EDF casting. These issues are usually minor and can be remedied easily. Skin compromise most commonly occurs due to:

1. Food and drink accidents
2. Urine and fecal accidents
3. Rough cast edges

Two suggested skin creams are available:

1. Aquaphor, the preferred over-the-counter skin healing cream suggested by most parents and hospitals.
2. Calendula cream, a natural derivative of the marigold flower, suggested by Dr. Mehta for less significant skin concerns.

Pre-testing a small area of the child's skin is required prior to widespread use to prevent any possibility of an allergic reaction.

Another beneficial skin care tip is "Flossing". Flossing a cast with a pair of nylons provides great relief to the child and helps slough off dead skin which alleviates overall itchiness under the cast. It is essential the child's skin is intact prior to flossing under the cast. Please see the Early Onset Scoliosis & Mehta casting FB group for a flossing demonstration.

20. Cast Removal

Mehta/EDF casts are removed at the hospital by the treatment team using an oscillating saw or, in some cases, by experienced casting parents at home. Discussing safe cast removal options with the Master Caster is essential prior to hospital discharge.

Some physicians support home cast removal, while others prefer parents avoid it.

Reasons to consider home cast removal include:

- Severe, non-healing skin issues
- Ineffective cast application (e.g., poor plaster setting; rare occurrence)
- A 48-hour cast break to allow the spine to relax prior to the next X-ray

21. Maintenance Bracing After Curve and Rotation Reduction

The Mehta/EDF casting series is followed by a well-made, removable brace for approximately one year to ensure the correction attained by the properly applied casting series is maintained. Successful treatment with serial Mehta/EDF casting occurs when the young spine and rotation have been guided and restored as close to their original state as possible.

The target Cobb angle will depend on the individual child's EOS presentation and is typically around 10 degrees. Every child's spine is unique, and spinal maintenance must be monitored diligently by both parents and providers during the brace maintenance phase. Master Casters will reschedule promptly if regression is noted.

A Message From Heather Hyatt, Founder of the Infantile Scoliosis Outreach Program

Thank you for reading our Early Treatment Principles. Please learn from it and do all necessary research to develop the right care plans for your darlings with scoliosis.

*Research the expertise level of your child's perspective Mehta cast team and discuss short/long term outcomes.

*Investigate and ask your child's spine doctor about conservative approaches with Mehta/EDF casting at 25 degrees, not 70.

*Insist on transparent dialogue between you and all medical professionals.

*If the curve is thoracic, relentless and affects lung space, begin dialogue with Pulmonary dept. to see if there's anything to be done proactively to prevent future respiratory compromise.

*Ask about your child's future and how to go about ensuring they have one.

Endorsement

I am very satisfied with everything that was written in this handout and I support it 100%.
—Jacques D'Astous, MD (FRCS(C)), Shriners Hospital, Salt Lake City, UT

"The time it takes for the curve to grow into the correct position is approximately equal to the time from curve detection to the child's first proper EDF treatment with plaster of Paris jackets."

— Min Mehta, MD, FRCS

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A Program of Ability Connection Colorado

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