The Use of a Carbon-fiber Ankle Foot Orthosis and Therapeutic Exercise for Managing Pain in an Adolescent with Severe Blood-induced Ankle Joint Arthropathy

Secondary to Type 3 von Willebrand Disease

# Children's Hospital Colorado

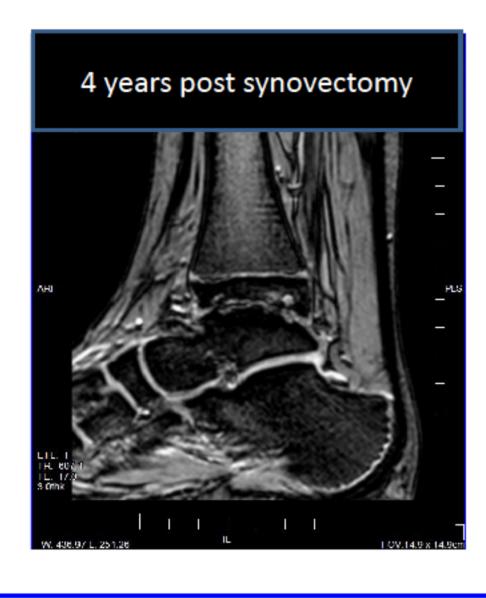
# Background

2-Department of Pediatrics, Section of Hematology/

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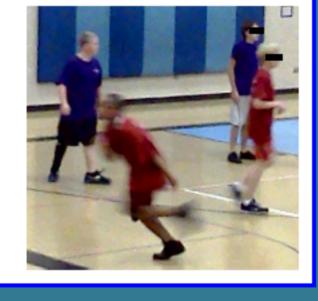
1-Mountain States Regional Hemophilia and Thrombosis Center, Aurora, CO, USA

- 12- year-old male with Type 3 von Willebrand Disease
- Developed synovitis secondary to bleeding
- Right ankle open synovectomy in 2007
- 4 years post synovectomy: severe ankle pain interfering with activities



## **Objectives**

- Reduce ankle pain
- Increase ankle ROM
- Increase ankle muscle strength
- Improve core muscle strength
- Improve gait speed and quality of gait
- Improve balance
- Increase activity/participation
- Improve quality of life



### Results

Johnson, MD1,2

Outcome Measures	Pre-In	itervention	Post-Intervention
Wong-Baker FPRS	Face	3 / 5	Face 1/5
Change in level of 1 Face is clinically significant			
Single Limb Stance			
Eyes Open	Left leg:	30 seconds	Left leg: 60 seconds
	Right leg:	10 seconds	Right leg: 60 seconds
Eyes Closed			Left leg: 37 seconds Right leg: 7.9 seconds
Gait	Antalgic Gait	•	More even weight shift Better push-off
6-Minute Walk Test	Without CF-/	AFO 437 m	Without CF-AF 533 m
MCID: 68 meters	With CF-AF	O 462 m	With CF-AFO 543 m
Hemophilia Joint Health Score –			
HJHS	15		15
MCID – not established			
Right Ankle ROM	DF: 0°	PF: 40°	DF: 1° PF: 43°
Muscle Strength:	DF: 4+/5	PF: 3/5	DF: 5-/5 PF: 3+/5
Right Ankle	Inv: 4+/5	EV: 4+/5	Inv: 5-/5 Ev: 5 /5
Muscle Strength		R	L R
Hips Bilaterally	Flexion:	5/5	Flexion: 5/5 5-/5
	Extension:	3+/5	Extension: 5/5 5-/5
	Abduction:	3+/5	Abduction: 5/5 5-/5
Abdominal Flexion	Supine:	3+ / 5	Supine: 4+/5
Participation - CAPE	Diversity	26	Diversity 18
	Overall Inten	sity 2.09	Overall Intensity 1.69
	Overall with	Whom 1.69	Overall with Whom 1.78
	Overall Whe	re 2.88	Overall Where 2.6
	Overall Enjo	yment 3.61	Overall Enjoyment 3.66
Paediatric Haemophilia Activities List	Sit/Kneel/Sta	and 70	Sit/Kneel/Stand 92
- PedHAL	Leg Function	n 37	Leg Function 62
	Arm Function	n 96.6	Arm Function 93
	Use of transportation 100		Use of transportation 100
	Self-Care 95.5		Self-Care 100
	Household to	asks 80	Household tasks 100
	Leisure / Spo	orts 28	Leisure / Sports 100
Canadian Hemophilia Outcomes-Kids	3'		
Life Assessment Tool	Child	76.6	Child 87.1
CHO-KLAT	Mother	52.3	Mother 66.1

#### **Methods / Intervention**

- 3 month program of exercise combined with use of a floor-reaction carbon fiber AFO and custom fitted orthosis
- Pain Reduction Floor -reaction, carbon fiber Functional foot orthosis
- Education

Necessity of prophylaxis Prescription for Celebrex Choosing low-impact activities

- Aerobic conditioning Cycling or walking for warm-up
- Therapeutic Exercise ROM, strengthening to LEs & core
- Balance Activities

Balance board, BOSU, gymnastic ball

- Gait
  - Mirror, foot position, weight shifting, cruising
- Agility

Cariocas, figure-8 drill, catching / throwing ball on unstable surface

## **Exercise Program**

- Core Strengthening
  - Transversus abdominus Lower abdominal controlled knee-to-chest Trunk Curls Gymnastic ball & quadruped activities
- Hip Strengthening
  - Bridging 2-leg and single leg abduction and adduction sidelying Hip extension prone
- Knee strengthening
- SLR controlling core musculature Sitting – knee extension
- Ankle ROM
  - Alphabet and towel scrunches
- Ankle Strengthening
  - Manual resistance, Level 2 theraband
- Stretching
- Hamstrings Quadriceps
- Gastrocnemius / Soleus
- Aerobic Exercise
- 60 minutes 5-7 days / week Walking or cycling

#### Conclusions

#### Significant changes noted:

- Wong-Baker Faces Pain Rating Scale : change in one face level is clinically significant
- 6-Minute Walk Test : change in distance > 68 meters

#### No significant change noted in:

•Participation – not a good measure for hemophilia? •HJHS – impairment measure, joint disease did not change

#### Showed slight improvement – not clinically significant:

 Single Limb Stance, Gait, CHO-KLAT and PedHAL (exception Activity for Leisure Sport 个 67%, and Leg Function 个 250%

Therapeutic Exercise combined with a Carbon-fiber AFO may be effective in managing chronic ankle pain.

#### References

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Poster

