



The Fate of The Broken Tether: How Do Curves Treated with Vertebral Body Tethering (Vbt) Behave After Tether Breakage?

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Background

VBT is a promising alternative to fusion for scoliosis. However, tether breakage is common (rates up to 50%) and it remains unknown whether the curve will stabilize or progress.

Methods

Adolescent and juvenile idiopathic scoliosis patients in a multicenter registry s/p VBT treatment with either 2 yr follow up or breakage prior to that. Broken tethers were identified by increase in screw divergence of $>5^\circ$ on serial radiographs.

Results

88 patients with tether breakage were identified with mean age at index VBT of 12.4 ± 1.4 years and mean curve magnitude $51.8^\circ \pm 8.1^\circ$. Breakage occurred at mean 29.5 ± 12.0 months and mean curve $33.9^\circ \pm 13.2^\circ$.

6.8% (6/88) had tether revision and 2/88 (2.3%) had fusion within the first year after breakage. At 1 year post breakage, remaining patients had a mean $36.2^\circ \pm 15.5^\circ$ curve. 22/51 (43%) had progression $>5^\circ$.

3 additional patients had a fusion between the 1st and 2nd year post breakage. At 2 years post breakage, the remaining patients had mean $40.5^{\circ} \pm 8.2^{\circ}$ curve. 15/30(50%) had progression $>5^{\circ}$.

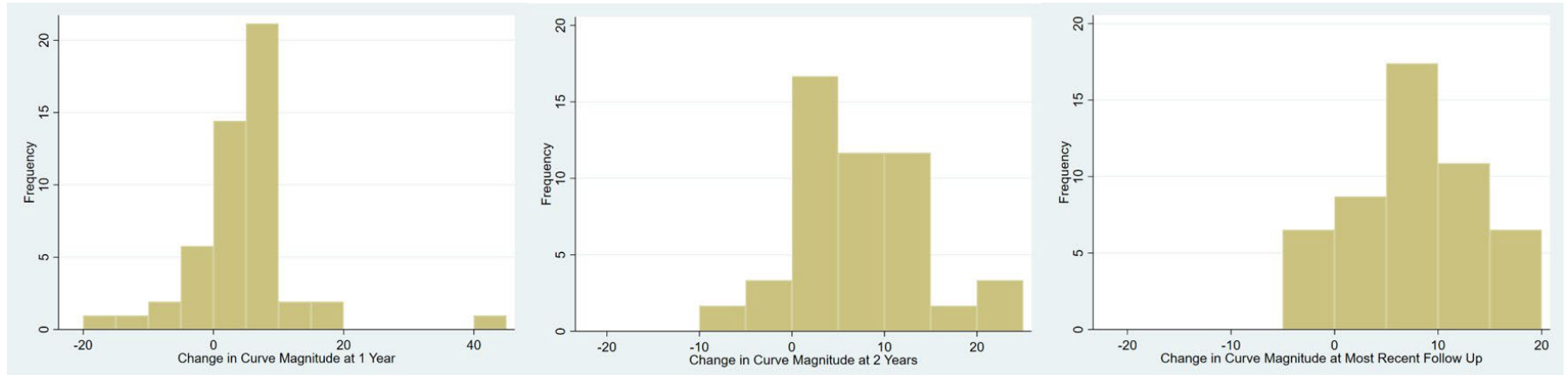
2 patients had a fusion >2 years post breakage. Remaining patients with follow-up >2 years post breakage had a mean curve of $38.5^{\circ} \pm 9.2^{\circ}$ and 11/21(52%) had progression $>5^{\circ}$. In total, 45%(27/60) of patients had progression $>5^{\circ}$ and 20%(12/60) had progression $>10^{\circ}$ post tether breakage.

29%(11/38 patients) with a curve $>35^{\circ}$ at breakage had additional surgery versus 2%(1/50) with $\leq 35^{\circ}$ ($p < 0.01$). Skeletally immature patients(Risser ≤ 3) had a higher rate of revision surgery compared to skeletally mature(Risser ≥ 4) patients(9/30, 30% vs 3/58, 5%; $p = 0.002$). Rates of curve progression $>5^{\circ}$ were similar between skeletally immature and mature patients(7/19, 37% vs 20/41, 49%, $p = 0.42$).

Conclusion

Nearly half had curve progression following breakage, including some that were skeletally mature. Approximately 30% of skeletally immature patients or those with curves $>35^{\circ}$ at time of breakage had additional surgery. Additional surgery was rare (1/50) for curves $<35^{\circ}$ at time of breakage.

Figure 1. Change in curve magnitude at 1 year, 2 year, and most recent follow up (from left to right).



Disclosures

- Michelle C. Welborn: DePuy Synthes (b,d,e); Stryker Spine (b,d); Nuvasive (b,d); Zimmer Biomet (a,e); Alexion/Astrozenica (b)
- Ron El Hawary: DePuy Synthes (a,b); Medtronic (a,b); OrthoPediatrics (b,c,e); Zimmer Biomet (a)
- John T. Smith: Globus Medical (b,g); NuVasive (b); Wishbone (b); GS Medical (b); Zimvie (b)
- Kenneth M. Cheung: Medtronic (b); NuVasive (a,b); Globus Medical (b); Avalon spinecare (a); AO Spine (a); OrthoSmart (g)
- Kenneth Illingworth: Consultant (b)
- David L. Skaggs: Zimmer Biomet (b,d,g); Medtronic (g); Globus Medical (b, g); Wolters Kluwer Health (g); Zipline Medical, Inc. (c); Green Sun Medical (c); Orthobullets (b,c,e); Top Doctors (c); NuVasive (a)
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- Lindsay M. Andras: Zimmer Biomet (d); Eli Lilly (c); Journal of Pediatric Orthopaedics (e); NuVasive (b,d); Orthobullets (b,d,g); Pediatric Orthopaedic Society of North America (e); Scoliosis Research Society (e); Medtronic (d)

Key:

- a - Grants/Research Support
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- f- Employee, Salary
- g - Other Financial or Material Support (royalties, patents, etc)