Iliac Endofibrosis In Elite Cyclists: What Are Its Symptoms Despite Normal Pulses: Diagnosis Is Difficult: Diagnostic Workup: Surgical Treatment And Prognosis

Jason T. Lee, MD
Chief, Division of Vascular Surgery
Professor of Vascular Surgery

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Case Presentation

41 yo F, long-distance cyclist (25+ years) and runner

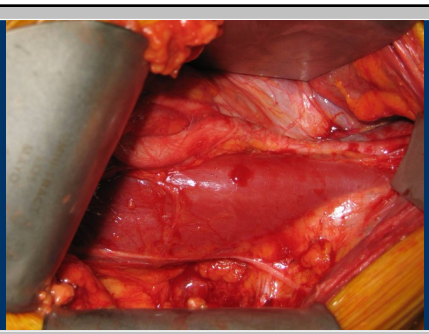
- 7 mo hx right leg complaints
  - Coldness, numbness after intense activity
  - Progressive course
  - No symptoms at rest
- Workup:
  - ABI in R leg: 1.15 → 0.27 after exercise
  - L leg: 1.3 → 0.88 after exercise
  - CT angiogram: 50% narrowing of R external iliac

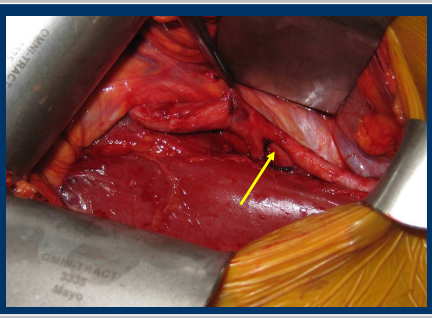

Sports Medicine Blog

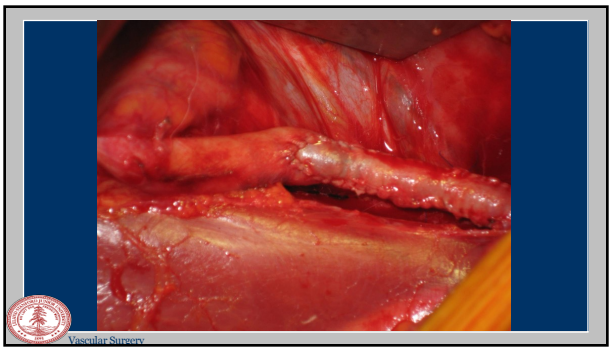
External Iliac Arteriopathy in Cyclists

Sports Medicine Blog

External Iliac Arteriopathy - An Update







What is EIA endofibrosis?

- 1986: Chevalier *et al* (Annals Vasc Surg)
  - 7 patients p/w intermittent claudication
    - ABI decreased, symptoms + after exercise
    - Arteriography: stenosis of Iliac artery
    - Rx: endarterectomy, shortening of artery
- 1990: Rousselet *et al* (Hum Pathol)
  - 23 cyclists, same symptoms and test results
    - Pathology: stenotic intimal thickening

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Epidemiology

- Most commonly associated with cyclists
  - Most cycle 8000-30000 km/year
    - Avg **150,000 km**
  - Avg age at onset of sx: 25
  - Avg age started cycling: 17
  - M>F
  - Avg time sx → dx: 3 years
- Also seen in speed-skaters, runners, soccer players

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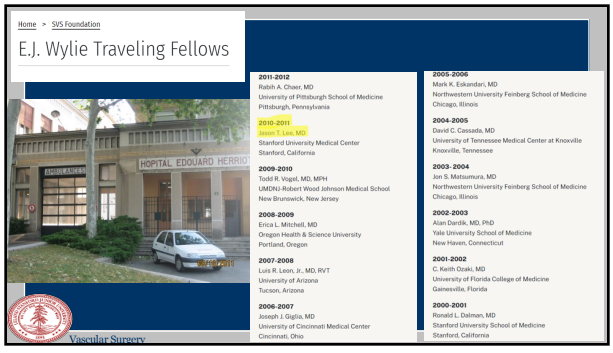

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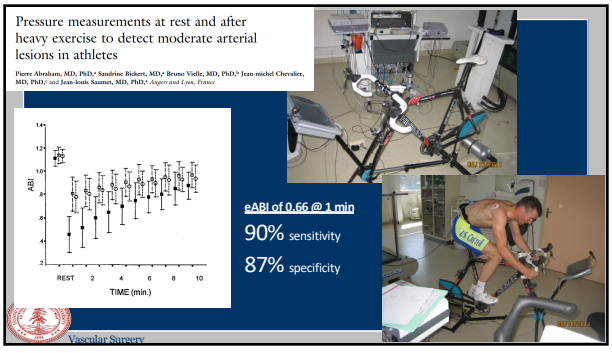

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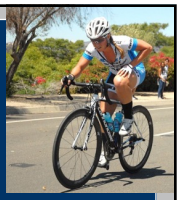
Operative Results of Iliac Artery Endofibrosis in High-Performance Athletes

Tiffany Wu, MD, Cornelius Olcott IV, MD, Jason T. Lee, MD. Stanford University, Stanford, Calif

Objective: Prior reports have documented excellent early results after surgery for external iliac endofibrosis in cyclists. We sought to evaluate our long-term functional outcomes in this select cohort of patients.

Methods: Patients undergoing reconstruction for symptomatic iliac artery endofibrosis at a single institution from 2000 to 2015 were reviewed. With Institutional Review Board approval, data were collected from medical record review and follow-up telephone interviews.

Results: Eighteen patients (mean age, 44 years; range, 26-57 years; 8



- Single institution, retrospective review 2000-2015
- Symptoms
  - **Loss of power** (n=16, 89%)
  - **Leg weakness or fatigue** (n=16, 89%)
  - **Resolution of symptoms at rest** (n=16, 89%)
- Non-invasive imaging
  - Normal resting ABIs (n=15, 83%)
  - Abnormal exercise ABIs (n=15, 100%)

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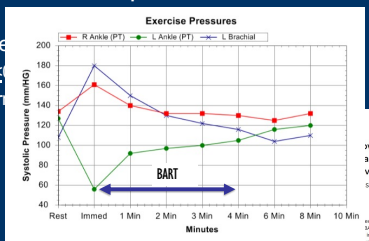
Workup: exercise ABIs

- Positive
  - ABI ≤
  - Return



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Sorondo, MD,[1] and

…external iliac artery endofibrosis. We evaluated a …BART). In a cohort of cyclists with symptomatic …n minutes for the ankle brachial index to return …ement in BART postoperatively (4.5 ± 4.1 vs 9.1 ± …tient satisfaction. Documentation of the BART's …f postoperative hemodynamic improvement. ☐

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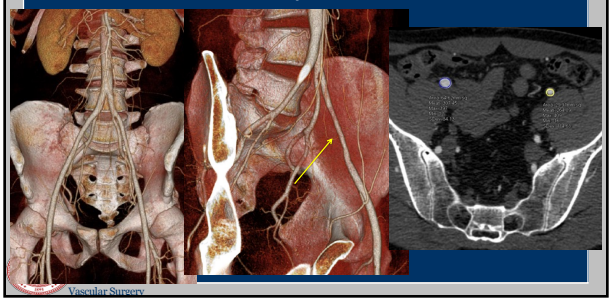
Workup: CT-A



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Workup: positional CT-A

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Results

	1 Year	Latest Follow Up (mean: 72 months)
Overall	17 (94%)	15 (83%)
Patch Angioplasty (n=9)	9	9
Shortening (n=4)	4	3
Bypass (n=5)	4	3
Inguinal Ligament Release (n=13)	13	13
Occluded at Presentation (n=3)	2	0

Activity level	(n=18)
Return to prior elite performance level	56%
Return to "high" performance level	89%
Currently active (6 year follow-up)	89%
Currently active in same sport	78%
Currently competing	33%
Currently symptom free	56%

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- Imaging understanding
  - Psoas hypertrophy
  - Arterial lengthening
  - kinking

Fig. 2. Anterior-posterior distance between the inguinal ligament and underlying bone as inguinal ligament crosses and compresses common femoral artery.

Fig. 3. Tortuosity index measurements of common iliac artery and external iliac artery using 3D arterial reconstruction.

ELSEVIER

Anatomic Factors Contributing to External Iliac Artery Endofibrosis in High-Performance Athletes

Andrea T. Fisher, Kenneth Tran, Sherraz S. Dosakhey, Sabina Sorondo, Arash Fereydooni, and Jason T. Lee, Stanford, California

Background: External iliac artery endofibrosis (EIAE) classically presents in cyclists with intimal thickening of the affected arteries. We investigated possible anatomical predisposing factors including psoas muscle hypertrophy, arterial tortuosity, inguinal ligament compression, and arterial kinking via a case-control comparison of symptomatic and contralateral limbs.

by the inguinal ligament have not been previously described, we created this measure because inguinal ligament release is an accepted operative technique for EIAE.[7,8]

Arterial tortuosity was quantified using tortuosity index (arterial-centerline distance divided by straight line distance traversed)[11] in the TeraRecon Intuition EVAR package (Aquarius Software, TeraRecon Inc., San Mateo, CA). We chose the distance-ratio tortuosity index over a sum-of-angles tortuosity measure since Schep et al. had previously found a higher distance-ratio tortuosity index among EIAE patients compared with control athletes.[12] Tortuosity was measured for the diseased arterial segment(s) and the same segments on the contralateral side, using

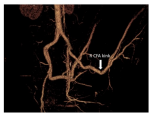

Fig. 4. Kinking of the right common femoral artery

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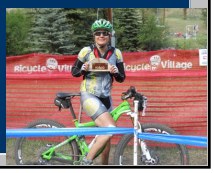
Conclusions

- Work-up should include bike exercise ABIs and positional CTA
- Surgical treatment results in durable patency in patients presenting without occlusion
  - Patch angioplasty vs replacement of area of luminal narrowing with inguinal ligament release
- 89% able to return to high level of cycling
  - Nearly half truly compete at prior peak cycling performance
  - 6 year results in long-term follow-up
  - Confirmed in other experienced US centers



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