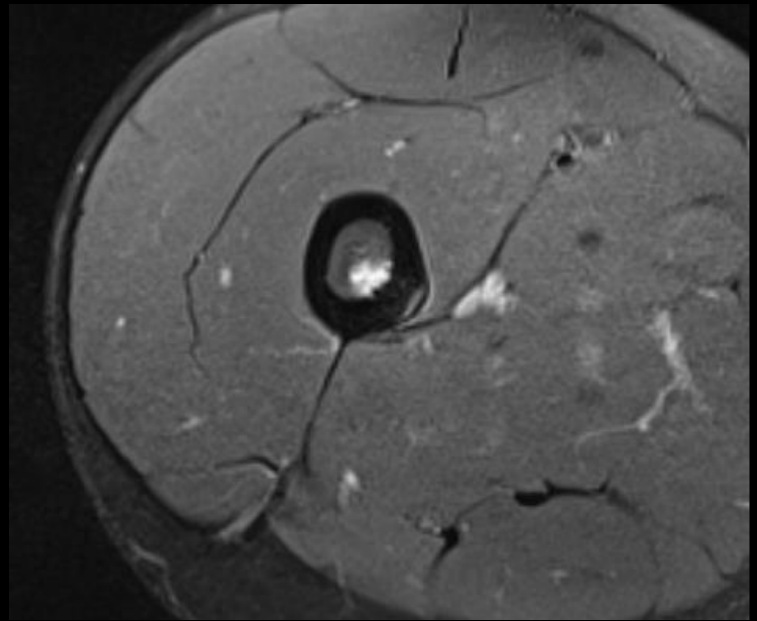
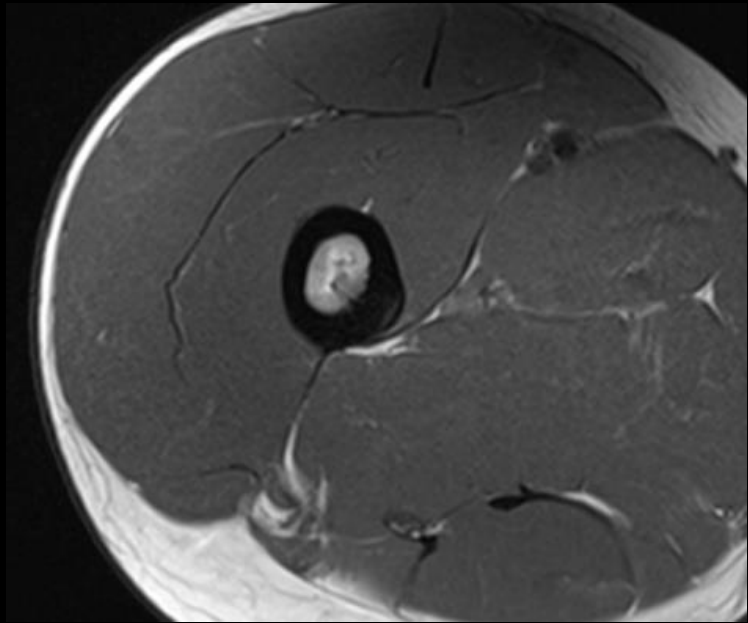


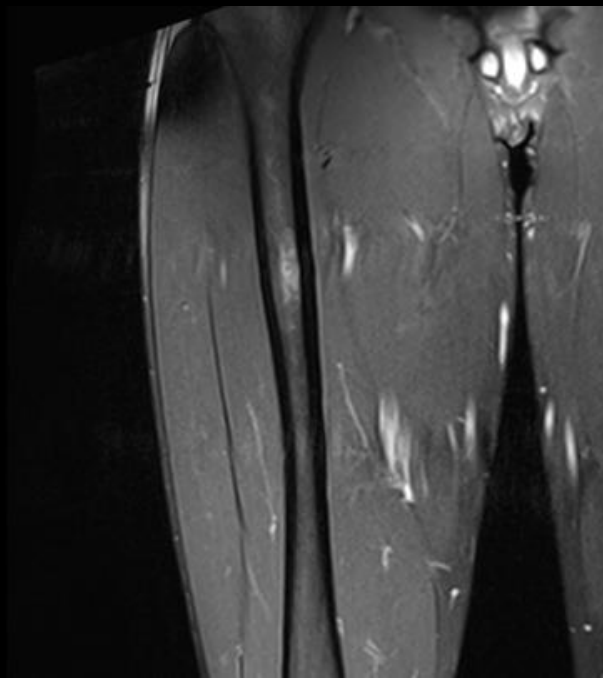
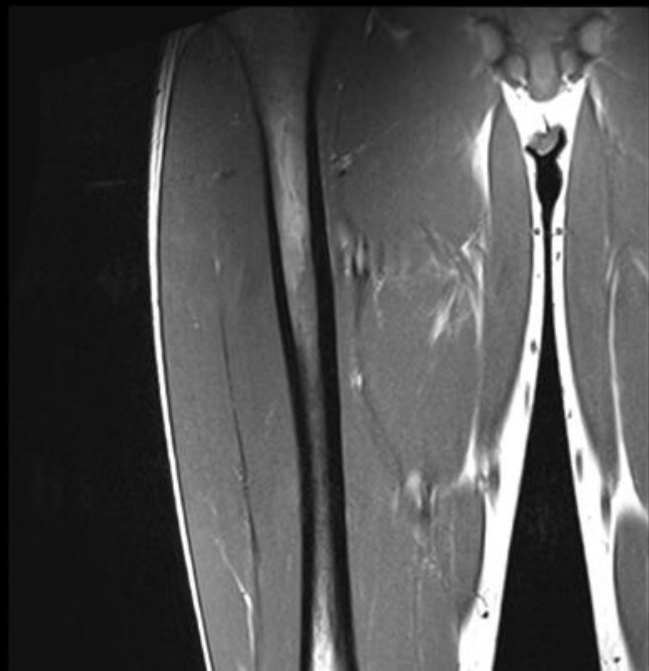


24yo M with progressive left thigh
pain and swelling, worse with
walking.

Bing Hu

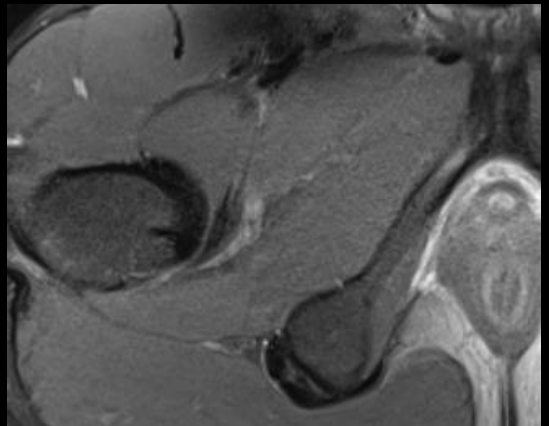
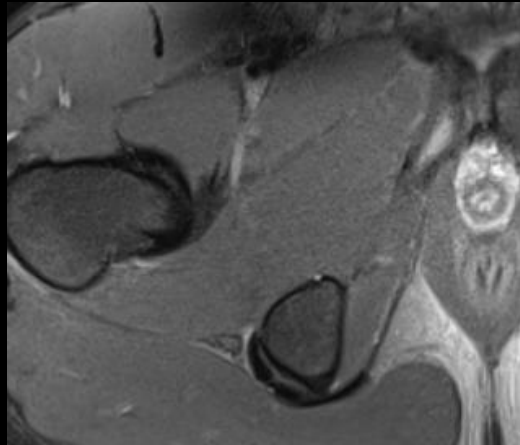
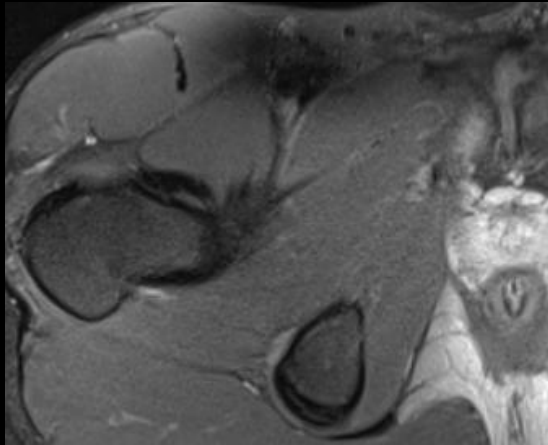
2017.04.21





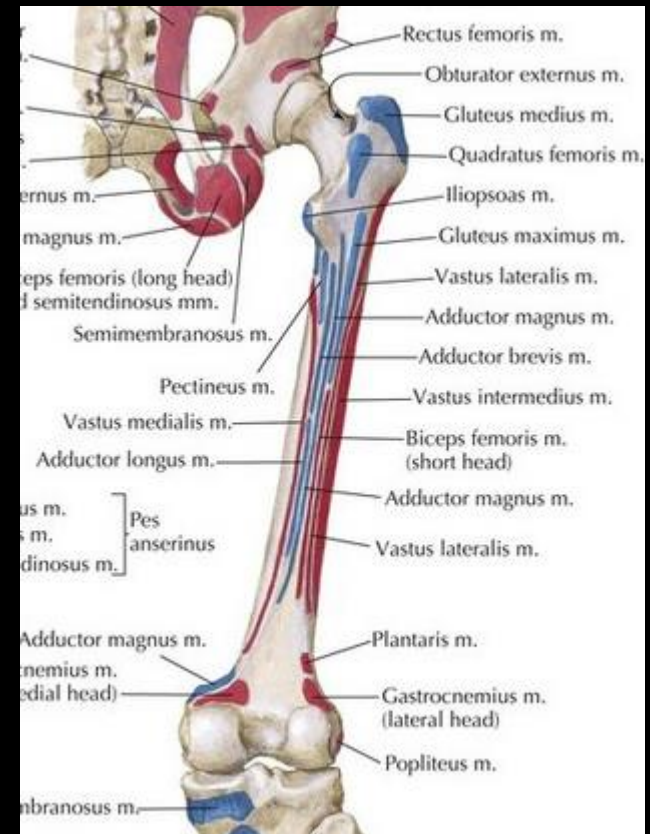
21 of 39





Adductor Insertion Avulsion Syndrome a.k.a. Thigh splints

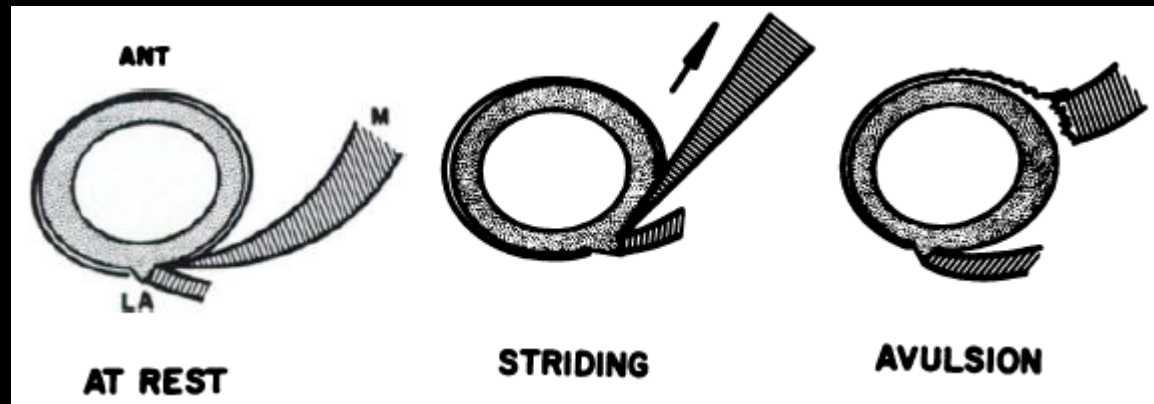
- Traction periostitis due to repetitive avulsive stress at insertion of adductor brevis and longus
 - May also occur after single episode of exertion
 - less often, adductor magnus or pectineus
- Activity-related hip, groin, or thigh pain and swelling, relieved with rest
- Young athletes, military personnel
- Female predominance
- Physical exam shows tenderness over adductor muscles, pain with resisted hip adduction and external rotation
- Symptoms resolve in 1-2 months with rest
- Akin to shin splints (soleus m. insertion onto tibia)



<http://plasticsurgerykey.com/comprehensive-lower-extremity-anatomy/>

Adductor muscles exert an anteromedially directed pull upon linea aspera

Excessive force leads to periosteal stripping anteromedially



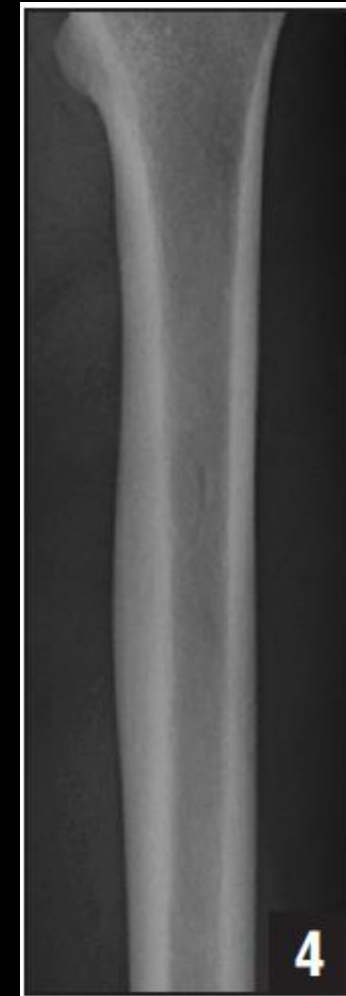
Radiographs usually normal

May show periosteal reaction along proximal third of medial femoral shaft

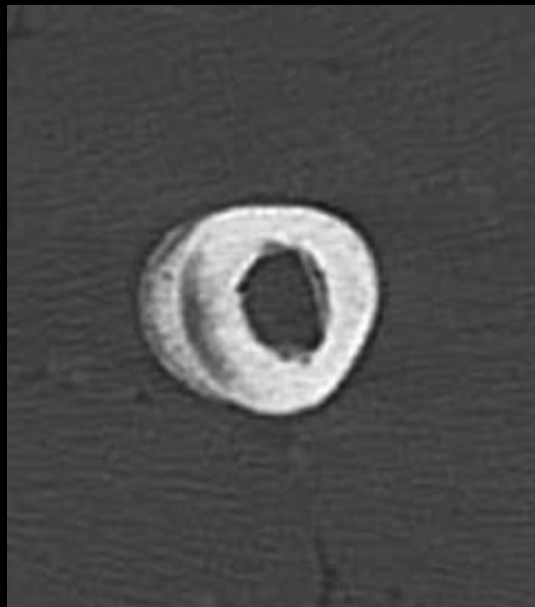
Initial



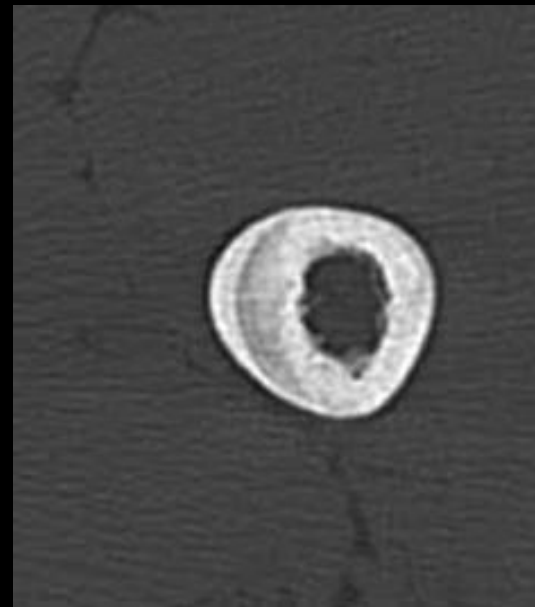
**3-month
followup**



CT may better delineate periosteal reaction and intracortical fracture



Initial

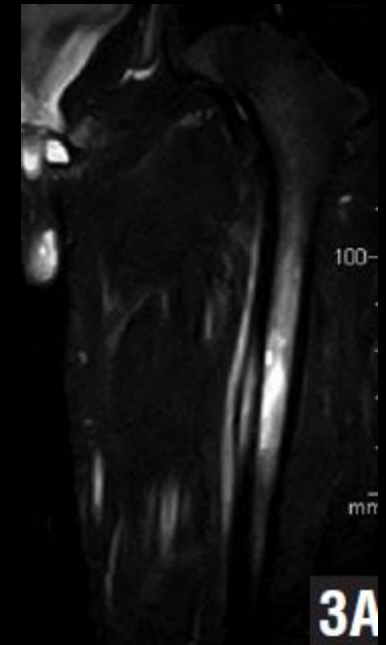
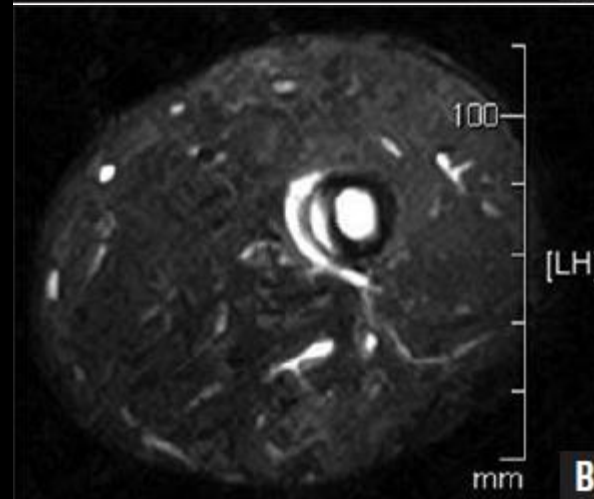
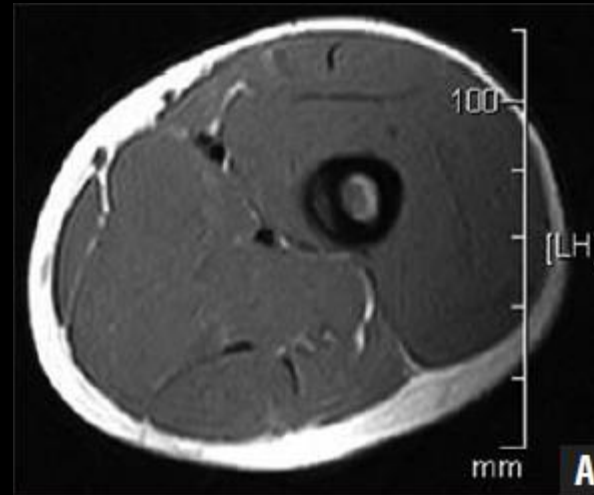


**3-month
followup**

Thin rim of hyperintense signal along medial periosteum of proximal to mid femoral shaft, along course of the adductor muscle insertions

Corresponding increased medullary marrow signal at level of periosteal abnormality

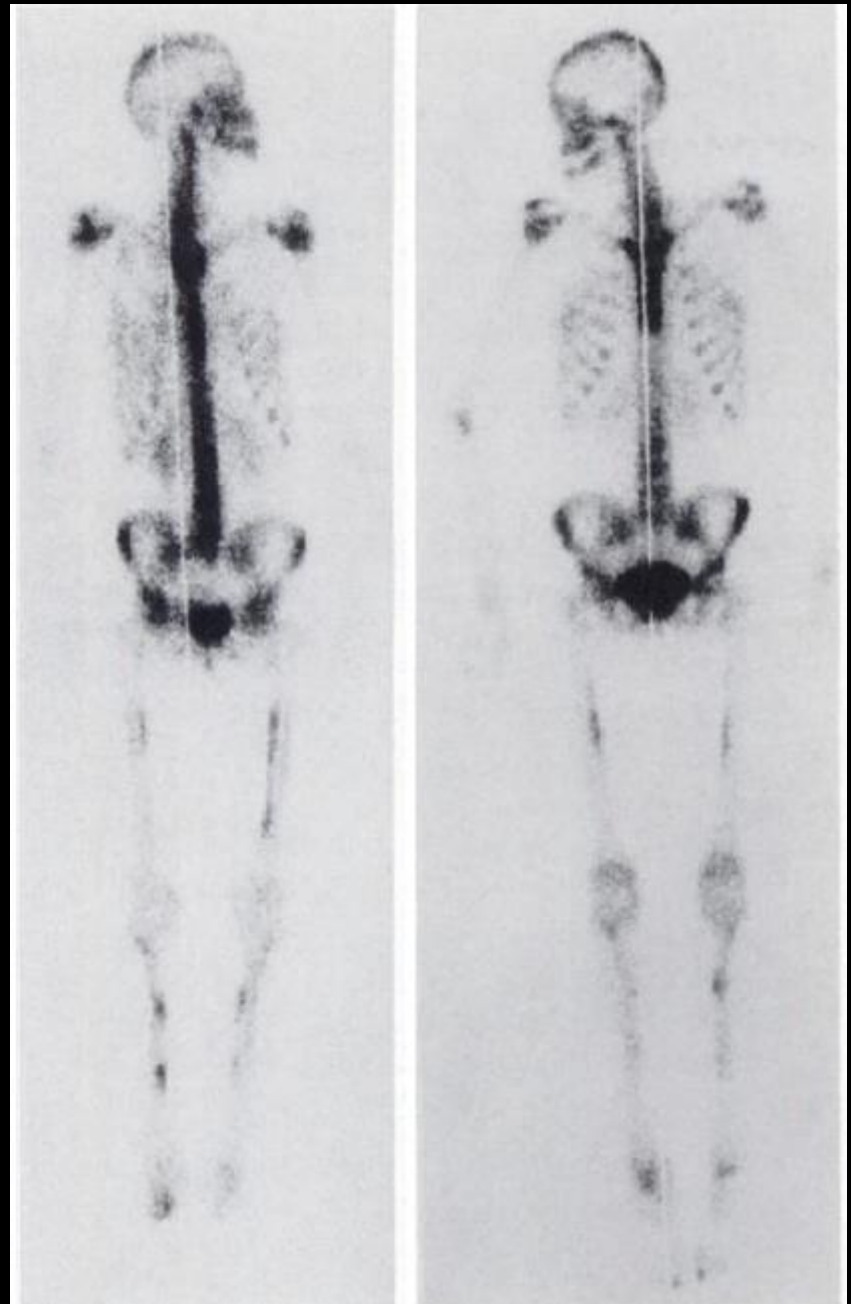
Intracortical fluid cleft heralds stress fracture



Bone scintigraphy is most sensitive for detection of thigh splints, although not specific.

Elongated foci of increased uptake on medial (and, to a lesser degree, lateral) femur without focal fracture.

Spans 15-44% length of femoral shaft



Ddx:

- Osteomyelitis
- Tumor
 - Osteoid osteoma
 - Intracortical hemangioma
 - Intracortical osteosarcoma
 - Ewing's, LCH, lymphoma in children

Stress Fractures of the Femur

Fatigue type

- 4th most common site (7.2% according to Matheson et al; after tibia, tarsals, metatarsals)

Insufficiency type

- 2nd most common site (after pelvis/sacrum)

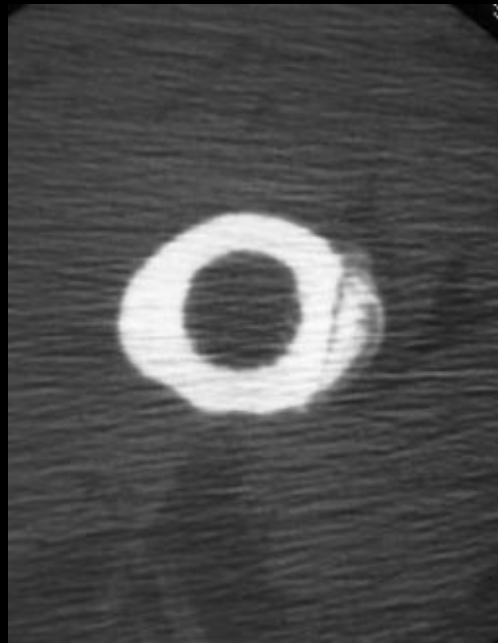
Usually transverse orientation

Neck, Diaphysis

Compressive or Tensile side

Longitudinal stress fracture of femoral diaphysis

Longitudinal , intracortical fracture in medial cortex of upper femoral shaft below lesser trochanter, parallel to cortical surface



Longitudinal stress fracture of femoral diaphysis



T1 pre



T1 post

Williams M, Laredo J-D, Setbon S, et al.

Unusual longitudinal stress fractures of the femoral diaphysis: report of five cases. Skeletal Radiol 1999;27:81-85

Longitudinal stress fracture of femoral diaphysis

- Gradual onset of hip, groin, proximal thigh pain, resolving in 6-11 months with rest
- May be fatigue or insufficiency type
- Demographics varies
 - Younger, athletic
 - Older, risk factors for osteoporosis
 - Female predilection for insufficiency type
- Hypothetical mechanism
 - Compressive force greatest at medial cortex of upper femur from axial loading, resulting in cortical remodeling and weakening
 - Concomitant stress from hip adductors, pectineus, and iliopsoas m.
 - Overload due to incapacitation of contralateral lower limb

References

1. Anderson MW, Kaplan PA, Dussault RG. Adductor insertion avulsion syndrome (thigh splints): spectrum of MR imaging features. *AJR Am J Roentgenol*. 2001 Sep;177(3):673-5.
2. Charkes ND, Siddhivarn N, Schneck CD. Bone scanning in the adductor insertion avulsion syndrome ("thigh splints"). *J Nucl Med*. 1987 Dec;28(12):1835-8.
3. Ozburn M, Nichols J. Pubic ramus and adductor insertion stress fractures in female basic trainees. *Mil Med*. 1981;146:332-334.
4. Tshering-Vogel D, Waldherr C, Schindera ST, Steinbach LS, Stauffer E, Anderson SE. Adductor insertion avulsion syndrome, "thigh splints": relevance of radiological follow-up. *Skeletal Radiol*. 2005 Jun;34(6):355-8.
5. Nishio J, Hara M, Naito M. Adductor insertion avulsion syndrome mimicking neoplastic processes in a 14-year-old long-distance runner. *Orthopedics*. 2012 Sep;35(9):e1442-5.
6. Singh AK, Dickinson C, Dworkin HJ, Sagar P, Patel S, Shirkhoda A. Adductor insertion avulsion syndrome. *Clin Nucl Med*. 2001 Aug;26(8):709-11.
7. Williams M, Laredo J-D, Setbon S, et al. Unusual longitudinal stress fractures of the femoral diaphysis: report of five cases. *Skeletal Radiol* 1999;27:81-85
8. Matheson GO, Clement DB, McKenzie DC, Taunton JE, Lloyd-Smith DR, MacIntyre JG. Stress fractures in athletes. A study of 320 cases. *Am J Sports Med*. 1987 Jan-Feb;15(1):46-58