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## Abstract

**Background:** Compartment Syndrome of the thigh (TCS) is a rare injury with limited published literature. The aim of this meta-analysis is to present an overview of the clinical manifestations, diagnosis, treatment, and complications of this injury

**Method:** A search was conducted using the preferred reporting items for systematic reviews and meta-analysis (PRISMA) guidelines on PubMed, OVID, and MEDLINE (Web of Science) with a focus on acute TCS with trauma predisposition.

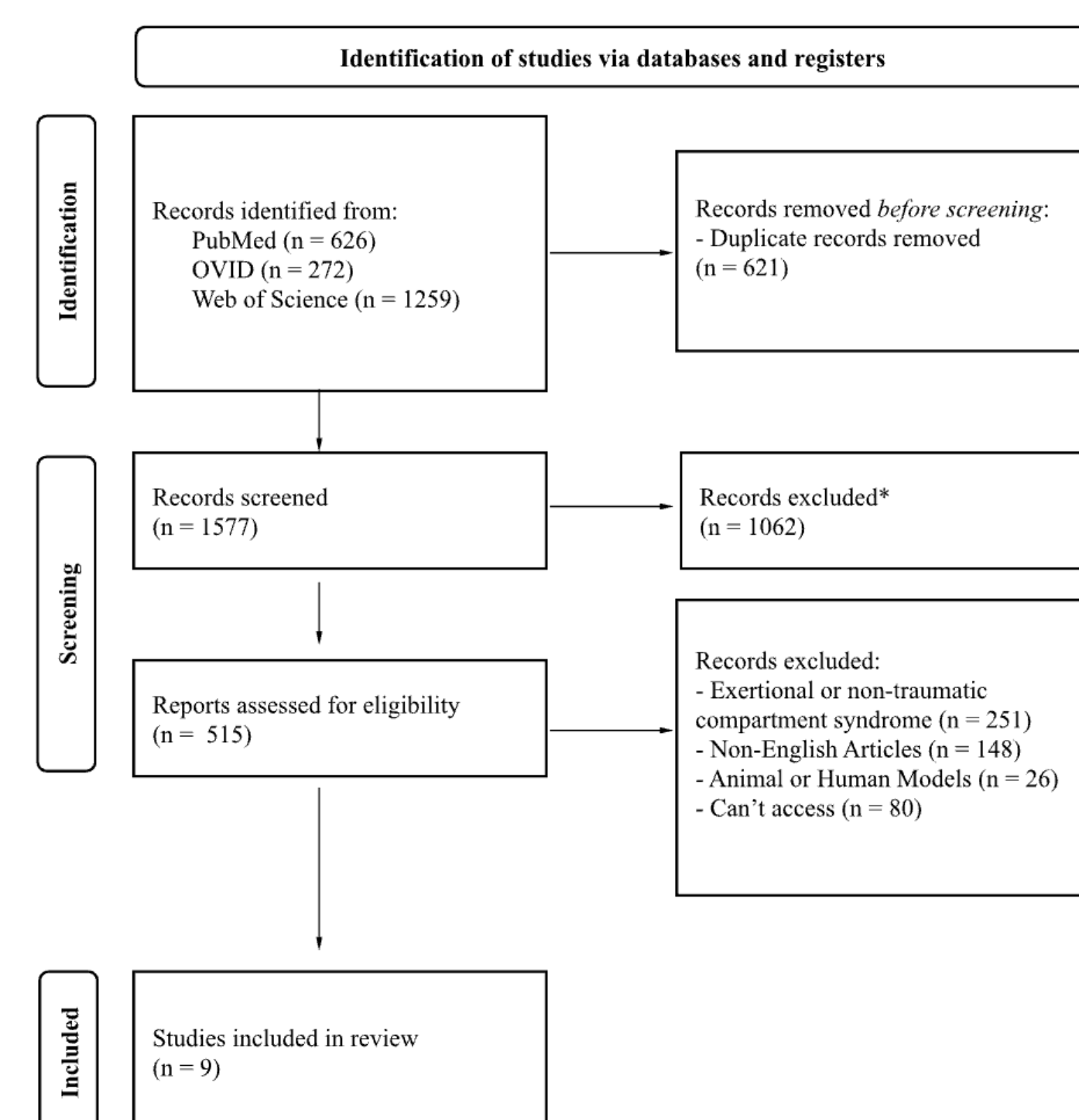
**Results:** A total of 9 retrospective cohorts with 8 studies in a level 1 trauma center and one in a military medical center resulted in 230 cases. A predominance of patients were younger males presenting with a tense, swollen thigh (52%) with the most common cause being blunt trauma (27%). Surgical treatment was primarily with single fasciotomy (76%) with delayed wound closer (42%).

**Conclusions:** This comprehensive review provides summative information about the characteristics and treatment of TCS. However, more data should be compiled, and future direction of research should include more focus on risk factors and more efficient management of the condition.

## Introduction

- Acute compartment syndrome (ACS) is an orthopaedic emergency as elevated compartment pressure can compromise vasculature and nerve structures distal to the site<sup>1</sup>
- Incidence of ACS is 7.3 out of 100,000 males and 0.7 out of 100,000 females with the leg being a 1 out of 10 occurrence<sup>1</sup>
- Diagnosis in a conscious patient is normally made with clinical assessment, but in the case of an unconscious, obtunded patient a pressure measurement of  $\Delta 20$  or  $\Delta 30$ mmHg<sup>2-3</sup>
- Thigh Compartment Syndrome is a rare condition that occurs about 0.3% of trauma patients<sup>2</sup>
- Due to its nature, there is limited literature with majority of knowledge deriving from case reports of case series

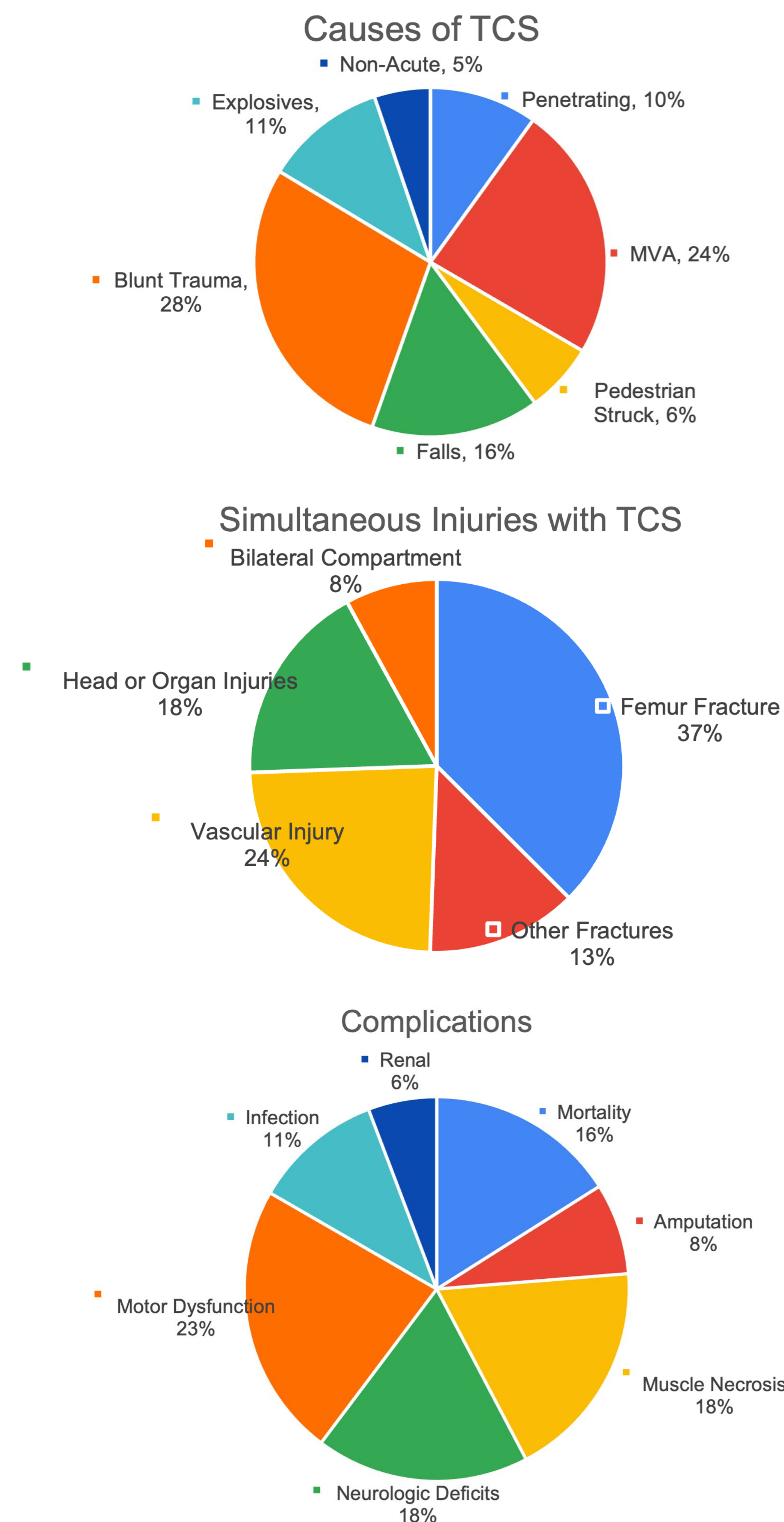
## Methods



## Results

Author	Year	No. of cases	Mean Age	Sex	Patient Population
Kanlic et al. <sup>4</sup>	2010	23	35.4	-	Level 1 Trauma Centers
Knab et al. <sup>5</sup>	2013	10	32	9 M, 1 F	Level 1 Urban Trauma Center
Mansini et al. <sup>6</sup>	2013	30	25.8	37 M	Military Medical Center
Mithöfer et al. <sup>7</sup>	2004	28	39.9	23 M, 5 F	Level 1 Trauma Centers
Mithöfer et al. <sup>8</sup>	2006	18	37	17 M, 1 F	-
Rameder et al. <sup>9</sup>	2019	69	42.9	61 M, 8 F	Level 1 Trauma Center
Rodriguez et al. <sup>10</sup>	2022	38	27	35 M, 3 F	Level 1 Trauma Centers
Suzuki et al. <sup>11</sup>	2005	8	36.5	8 M	Level 1 Trauma Center
Verweibe et al. <sup>12</sup>	2009	9	34.8	-	Level 1 Trauma Center
Total or average	-	240	34.6	190 M, 18 F	-

Figure 1: Characteristics of studies



## Discussion

### Discussion:

- Blunt Trauma (27%) is considered the most common cause of TCS in almost all studies, but hematomas caused by MVCs (24%) were debated to be the most common in other studies
- Diagnosis was primarily made by the clinical finding of a tense, swollen thigh (52%), but if obtunded then a compartment pressure of  $\Delta 30$  or  $\Delta 40$ mmHg<sup>6-7, 11-12</sup>
- Treatment of TCS should be done as soon as TCS is suspected with an average time from admission to compression being 23 hours with a single incision fasciotomy (76%) being common practice<sup>13</sup>
- As TCS commonly occurred in polytrauma patients with ipsilateral femoral fracture being the most frequent (29%) followed by vascular injury (18%). Injury Severity Score (ISS) averaged 18.5 across studies with mortality being associated with ISS of 25-27<sup>6,8</sup>
- The most common complication was motor dysfunction (16%) including but not limited to cramping, spasm, persistent limp, weakness, and decreased ROM

### Limitations:

- By being heavily dependent on retrospective cases, discrepancies in incidence rates or patient's documentation may have affected quality of data
- Studies are limited by size of cohort with the largest cohort being 69
- As there was a focus on acute causes of TCS, non-acute causes may have a role in understanding TCS overall

## References

- Hammerberg ME. Up to Date. 2023. Accessed 2023 October 29. <https://www.uptodate.com>. Verwiebe
- Torlincasi AM, Lopez RA, Waseem M. Acute compartment syndrome. 2023. Accessed 2023 October 29. <https://www.ncbi.nlm.nih.gov/books/NBK448124/>.
- Kanlic EM, Pinski SE, Verweibe EG, Saller J, Smith WR. Acute morbidity and complications of thigh compartment syndrome: A report of 26 cases. Patient Saf Surg. 2010;4:13-22.
- Knab LM, Buzeid A, Rodriguez H, Issa N. Thigh compartment syndrome trauma: bullets to blame, not collisions. J Surg Res. 2013;185(2):748-52.
- Mithöfer K, Lhowe DW, Vrahas MS, Altman DT, Altman GT. Clinical spectrum of acute compartment syndrome of the thigh and its relation to associated injuries. Clin Orthop Relat Res. 2004;(425):223-9.
- Mithöfer K, Lhowe DW, Vrahas MS, Altman DT, Erens V, Altman GT. Functional outcome after acute compartment syndrome of the thigh. J Bone Joint Surg Am. 2006;88(4):729-37.
- Rameder P, Schmidt R, Machold W, Tiefenboeck TM, Bukaty A, Huf W, et al. Epidemiology, treatment, and outcome after compartment syndrome of the thigh in 69 cases - Experiences from a level 1 trauma centre. Injury. 2019;50(6):1242-46.
- Rodriguez J, Suneja N, Keudell AV, Zhang D. Surgical demographics of acute thigh compartment syndrome. Injury. 2022;53(10):3841-85.
- Suzuki T, Moimura N, Kawai K, Sugiyama M. Arterial injury associated with acute compartment syndrome of the thigh following blunt trauma. Injury. 2005;36(1):151-9.
- Verwiebe EG, Kanlic EM, Saller J, Abdelgawad A. Thigh compartment syndrome, presentation, and complications. Bosn J Basic Med Sci. 2009;9(Suppl 1):S28-33.
- Kanlic EM, Pinski SE, Verweibe EG, Saller J, Smith WR. Acute morbidity and complications of thigh compartment syndrome: A report of 26 cases. Patient Saf Surg. 2010;4:13-22.
- Schwartz JT, Brumback RJ, Lakatos R, Poka A, Bathon GH, Burgess AR. Acute compartment syndrome of the thigh. A spectrum of injury. J Bone Joint Surg Am. 1989;71:392-400.
- Ojike NI, Roberts CS, Giannoudis PV. Compartment syndrome of the thigh: a systematic review. Injury. 2010;41(2):133-6.