

Contents lists available at [ScienceDirect](#)

Acta Orthopaedica et Traumatologica Turcica

journal homepage: <https://www.elsevier.com/locate/aott>

Does the saline load test still have a role in the orthopaedic world? A systematic review of the literature

Benjamin B. Browning^a, Anthony V. Ventimiglia^a, Anant Dixit^a, Emmanuel Illical^a, William P. Urban^a, Julio J. Jauregui^{b,*}

^a SUNY Downstate Medical Center, Brooklyn, NY, United States

^b University of Maryland Medical Center, Baltimore, MD, United States

ARTICLE INFO

Article history:

Received 25 October 2015

Received in revised form

11 January 2016

Accepted 16 January 2016

Available online xxx

Keywords:

Saline load test

Knee arthrotomy

Joint arthrotomy

Traumatic joint injury

ABSTRACT

Introduction: The aim of this systematic review was to assess the efficacy of Saline load tests (SLTs) to evaluate extension of periarticular wounds into capsule in emergent settings.

Methods: We systematically reviewed the literature to evaluate the accuracy of the SLT in diagnosing penetrating joint injuries in the elbow, wrist, shoulder, knee, or ankle.

Results: The SLT values to determine knee arthrotomies vary from 73.8 mL to 194 mL with sensitivities ranging between 91% and 99% depending on the size of the laceration. A SLT of 30 mL in the ankle yields sensitivities ranging from 95% to 99% in assessing joint penetration. A SLT of 45 mL in the elbow yields a sensitivity of 95% in assessing joint penetration. The addition of methylene blue does not change the sensitivity of the SLT.

Conclusion: Several studies have demonstrated the utility of the SLT as a diagnostic modality for penetrating joint injuries. However, the literature analyzed in this study was inconclusive and more studies are required to make definitive recommendations. In addition, more studies will be needed on joints other than the knee, pediatric patients, and the use of methylene blue dye in conjunction with SLT.

Level of evidence: Level II, Diagnostic study.

© 2016 Turkish Association of Orthopaedics and Traumatology. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Ascertaining the integrity of the joint capsule is of high clinical importance in the evaluation of periarticular wounds due to the high possibility of developing a septic arthritis and the potentially catastrophic sequelae.¹ Open knee joint injuries are prevalent amongst young males and commonly result from gunshot wounds, blunt injuries from motor vehicle accidents, falls, and sharp objects.^{2–5} Analysis of these studies found a mean periarticular wound size of approximately 4 cm, an incidence of concurrent fracture ranging from 24% to 55%, and an infection rate which ranged from 0% to 11.8%.⁶

Currently, the gold standard diagnosis for a penetrating joint injury is intraoperative inspection of the joint capsule. However, this

approach exposes patients to the risks associated with surgery, is time consuming, and is associated to overall higher costs.⁴ Konda et al recently demonstrated the usefulness of computed tomography scans (CT) in diagnosing traumatic arthrotomies based on the ability to visualize intra-articular air.⁵ They reported sensitivity and specificity of 100% utilizing 2 mm slices. Although promising, CT scans may be expensive, time consuming, and sometimes unavailable in an emergency setting. Therefore, other diagnostic modalities, such as saline load test (SLT), are utilized in clinical practice. The SLT consists of injecting sterile saline into a joint where a penetrating joint injury is suspected. The site of injection is carefully chosen to avoid the periarticular wound. Extravasation of saline from the joint constitutes a positive test. Failure of extravasation is defined as a negative SLT and implies an intact joint capsule.

Although the SLT has been shown to be useful in the diagnosis of open joint injuries, there is a lack of consistency in the literature regarding the volume of saline required to generate a reliable test. Although sixty milliliters of saline had been the standard volume of injection in the knee,⁴ recent studies have disputed the reliability of

* Corresponding author.

E-mail address: juljau@gmail.com (J.J. Jauregui).

Peer review under responsibility of Turkish Association of Orthopaedics and Traumatology.

<http://dx.doi.org/10.1016/j.aott.2016.01.004>

1017-995X/© 2016 Turkish Association of Orthopaedics and Traumatology. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

this volume. Studies by Nord et al and Keese et al have suggested load volumes of 155 mL and 194 mL respectively to achieve a sensitivity of 95%.^{7,8}

To the best of our knowledge there has not been a study that has systematically evaluated the ability of the SLT to detect open wound injuries within different joints. Furthermore, most of the literature focused on the SLT is limited to the knee joint. The purposes of our study were¹ to determine the utility of SLT with different volumes and dyes within the knee joint, and² to determine the utility within other joints as reported in the literature to date.

Methods

A systematic review of the literature regarding the SLT was performed utilizing the preferred reporting items for systematic review and meta-analysis protocols (PRISMA guidelines).⁹ We evaluated the EMBASE, Medline, and Ovid libraries, identifying all studies published until September 2015. Utilizing the search strings “saline load test”, “saline load test wrist”, “saline load test shoulder”, “saline load test knee”, “saline load test hip”, “saline load test elbow” and “saline load test ankle”, 656 studies were retrieved. Limiting the search to studies written only in English yielded 618 studies which were then carefully reviewed.

A specific set of inclusion and exclusion criteria were applied to these 618 studies. Specifically, we included studies evaluating the accuracy of the SLT in diagnosing penetrating joint injuries in the elbow, wrist, shoulder, knee, or ankle. Single case reports, literature reviews, and the SLT involving the gastrointestinal system were excluded from our study but used for cross-referencing, which revealed no additional sources. After applying these criteria, 10 relevant studies were included in our analysis (Fig. 1). Six of these studies reported data from the SLT of the adult knee,^{4,5,7,8,10,11} one study reported data from SLT of the pediatric knee,¹² one study reported data from the wrist,¹³ one study reported on data from

cadaveric elbows,¹⁴ and one study reported data from several different joints.¹⁵ Additional cross-referencing of these studies yielded no further studies. There were no studies evaluating SLT of the hip or shoulder joints.

Results

There were 10 studies in our analysis which evaluated a total of 467 patients and 505 joints: 438 knees, 23 ankles, 40 elbows, 2 wrists, and 2 proximal interphalangeal joints (PIPs) (Table 1). All of these were in living patients except for 36 elbows, which were performed in cadavers. Within the knee joint, the most common indication was performed during an arthroscopy without providing detailed information of the primary diagnosis. The most common indications which were performed in a non-arthroscopic setting for a SLT of the knee included gunshot wounds, falls, and motor vehicle accidents (Table 2). Saline load test indications for joints other than the knee were either performed during arthroscopy or not provided. In terms of the correlation of between injected volume and

Table 1
Details of studies.

Author	LOE	Ankle	Elbow	Knee	Wrist	PIP
Bariteau et al., 2013 ¹³	II	21	0	0	0	0
Feathers et al., 2011 ¹⁴	II	0	36	0	0	0
Haller et al., 2015 ¹²	III	0	0	87	0	0
Keese et al., 2007 ⁸	III	0	0	30	0	0
Konda et al., 2013 ⁵	III	0	0	37	0	0
Konda et al., 2013 ⁶	III	0	0	50	0	0
Metzger et al., 2012 ¹⁰	I	0	0	58	0	0
Nord et al., 2009 ⁷	I	0	0	56	0	0
Tornetta et al., 2007 ¹¹	I	0	0	80	0	0
Voit et al., 1996 ¹⁵	II	2	4	40	2	2

LOE: Level of Evidence, PIP: Proximal Interphalangeal Joint.

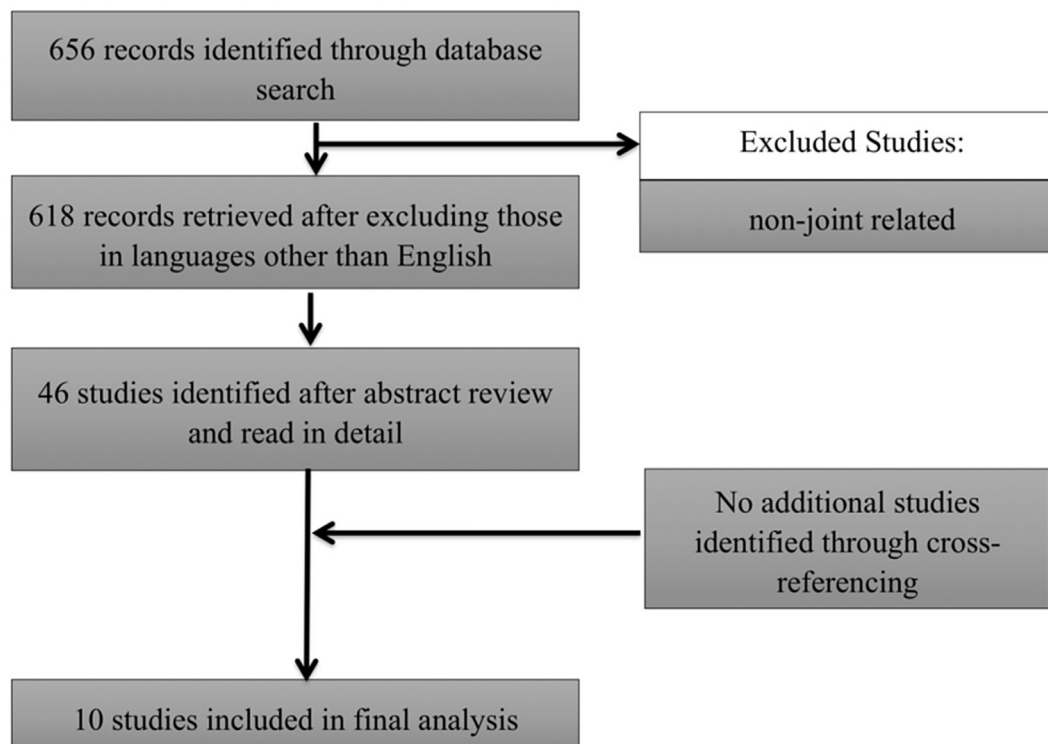


Fig. 1. Flowchart of inclusion and exclusion criteria for literature search.

Download English Version:

<https://daneshyari.com/en/article/8795621>

Download Persian Version:

<https://daneshyari.com/article/8795621>

[Daneshyari.com](https://daneshyari.com)