Int Surg 2012;**97**:327–334

A Literature Review on the Role of Totally Extraperitoneal Repairs for Groin Pain in Athletes

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A literature review was made on the role of totally extraperitoneal (TEP) hernia repairs for groin pain in athletes. Electronic databases were searched for literature published from January 1993 to November 2011. There were 10 articles incorporating 196 patients included in this review. Thirty percent of patients were reported to have direct inguinal hernias, 22% had indirect inguinal hernias, and 41% had dilated internal rings. Of note, 30% of cases had no macroscopic abnormality. Four studies reported on an early follow-up ranging between 3 and 6 weeks. Only minimal or mild symptoms were reported. Up to 33% of patients had impaired ability to perform at peak levels. Up to 53% of patients had persistence of symptoms at the early follow-up. Total follow-up time ranged from 3 to 80 months, and most patients were active (90%–100%). At long-term follow-up, 3% to 10% were unable to play, and 5% were reported as being unable to train. Two studies from the same center reported on TEP surgery for osteitis pubis, and most patients returned to sporting activity after 4 to 8 weeks. TEP repair is a good operative intervention in athletes with chronic groin pain not relieved by conservative measures. Athletes recover quickly and return to sport early.

Key words: Laparoscopic repair – Sports hernia – Gilmore groin – Athletic pubalgia

Considerable debate surrounds the causes and definition of groin pain in athletes; some defining it as an incipient hernia in an athlete, while others describe it as chronic groin pain with no obvious macroscopic pathology.[1] Furthermore some argue that a spectrum exists and may extend to osteitis pubis.[2] The reported incidence ranges from 0.5% to 28%[3–8] and is a significant concern affecting about 5% of all football players.[9] Imaging such as X-ray, computed tomography (CT), magnetic resonance imaging (MRI), or bone scans may help diagnose other treatable pathologies.[10,11]

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Options for treatment include conservative methods such as rest, analgesia, local injections, and physiotherapy. However there are variable results, and athletes often return for more definitive solutions such as surgical intervention.[12–14] Operative measures are reported by some as having good results, with 90% to 96% of patients returning to sport activity after open repair with or without mesh.[15,16] Evidence over the previous 2 decades has suggested that laparoscopic procedures have considerable advantages over open techniques in other settings,[17,18] and this has been extended to totally extraperitoneal (TEP) and transabdominal preperitoneal (TAPP) techniques.[19] Some have suggested that TEP has the potential for less postoperative pain,[20] hence the aim of this study is to review the literature on the role of TEP in treating chronic groin pain in athletes.

Methods

All published studies investigating the role of TEP repairs in the treatment of sportman hernia between January 1993 and November 2011 were identified. We searched the Cochrane library, EMBASE, and PubMed databases available online. The text words ''Gilmore groin,'' ''sportman hernia,'' ''totally extra-peritoneal hernia repair,'' ''TEP hernia repair,'' ''laparoscopic hernia repair,'' ''pubic arthralgia,'' ''groin pain,'' ''athletic groin pain,'' and ''pubic osteitis'' were used. Relevant articles referenced in these databases were obtained and the ''related article'' function was used to widen the results. This was complemented by hand searches and cross-references from articles identified during the initial search. There were 114 references. Irrelevant articles and reviews, evident from the titles and abstracts, were excluded. No language restriction was applied. We reviewed full texts of 26 articles. Fourteen articles were of potential relevance; however, on closer examination 3 reported on transabdominal approaches, and 1 study was unclear on technique, yet suggested an open technique. Our search results are summarized in Fig. 1.[21] All clinically relevant demographics are described. Postoperative outcomes chosen for this review were postoperative pain, return to work or normal activity, and persistence.

Results

There were 10 articles included in this review.[2,6,9,14,22–27] Two articles focused on osteitis pubis confirmed on MRI or bone scan.[2,27] Eight studies[6,9,14,22–26] investigated a total of 196 patients. From the 8 studies (Table 1), sixty-five percent were football players. Preoperative imaging was performed in 6 studies and included a combination of X-rays, bone scans, MRI, ultrasound, and CT scans.[6,9,14,23,24,26]

The type of preoperative pain was not well described by any of the studies and was stated as being a dull ache or pulling sensation in 2 articles.[14,25] Pain was reported to occur at rest in 81% of patients[6,14,22,24] and had lasted between 2 and 13 months.[6,9,14,22,24–26] Most studies reported an initial conservative approach incorporating measures such as rest, steroids, physiotherapy, hydrotherapy, and analgesics.[6,22–24,26] Ninety-six percent of patients reported pain in the groin[6,9,14,22,24,26]; other sites included the lower abdomen and pubic bone, and 29% of athletes had bilateral pain.[6,14,22,24,26] On examination, only 18% of patients were diagnosed with an inguinal hernia.[6,9,22,23] Four studies did not report all their clinical examination findings.[14,24–26]

All patients underwent a TEP repair except for 3 patients where a transabdominal approach was converted to a TEP.[6] Six articles reported the use of a balloon spacer to develop the plane.[9,14,22–25] Most studies[6,9,14,22,24–26] used a polypropylene mesh, except one that used a biological mesh[23] and was fixed using tacks or glue; 2 studies reported the use of abdominal pressure alone.[6,26] Operative time ranged from 17 to 60 minutes.[9,14,22,23,25] Six percent of all patients underwent a concurrent open tenotomy to relieve symptoms.[14,24,26]

Thirty percent of patients were reported to have a direct inguinal hernias,[6,14,22–26] 22% had indirect inguinal hernias,[6,9,14,22–26] and 41% had dilated internal rings.[9,22–25] Of note, 30% of cases had no macroscopic abnormality. There were 3 (2%) complications from all the studies,[14,23,26] including 2 seromas and 1 wound infection. Most patients were discharged on the same day or the next with simple analgesics, NSAIDs or oral narcotics.[14,22–25] Two studies reported analgesics were stopped after 3 days with early mobilization at 24 hours.[22,25]

Four studies reported on an early follow-up ranging between 3 and 6 weeks.[6,14,22,24] Only minimal or mild symptoms were reported[14,22,24]; one study reported on a combined follow-up of patients undergoing TAPP and TEP but reported that only 2 patients (14%) had a nagging sensation present in the groin.[6] Up to 33% of patients had impaired ability to perform at peak levels[14,22,24]; a further study reported on TAPP and TEPP, with 14% being pain free but having impaired ability.[6] One study

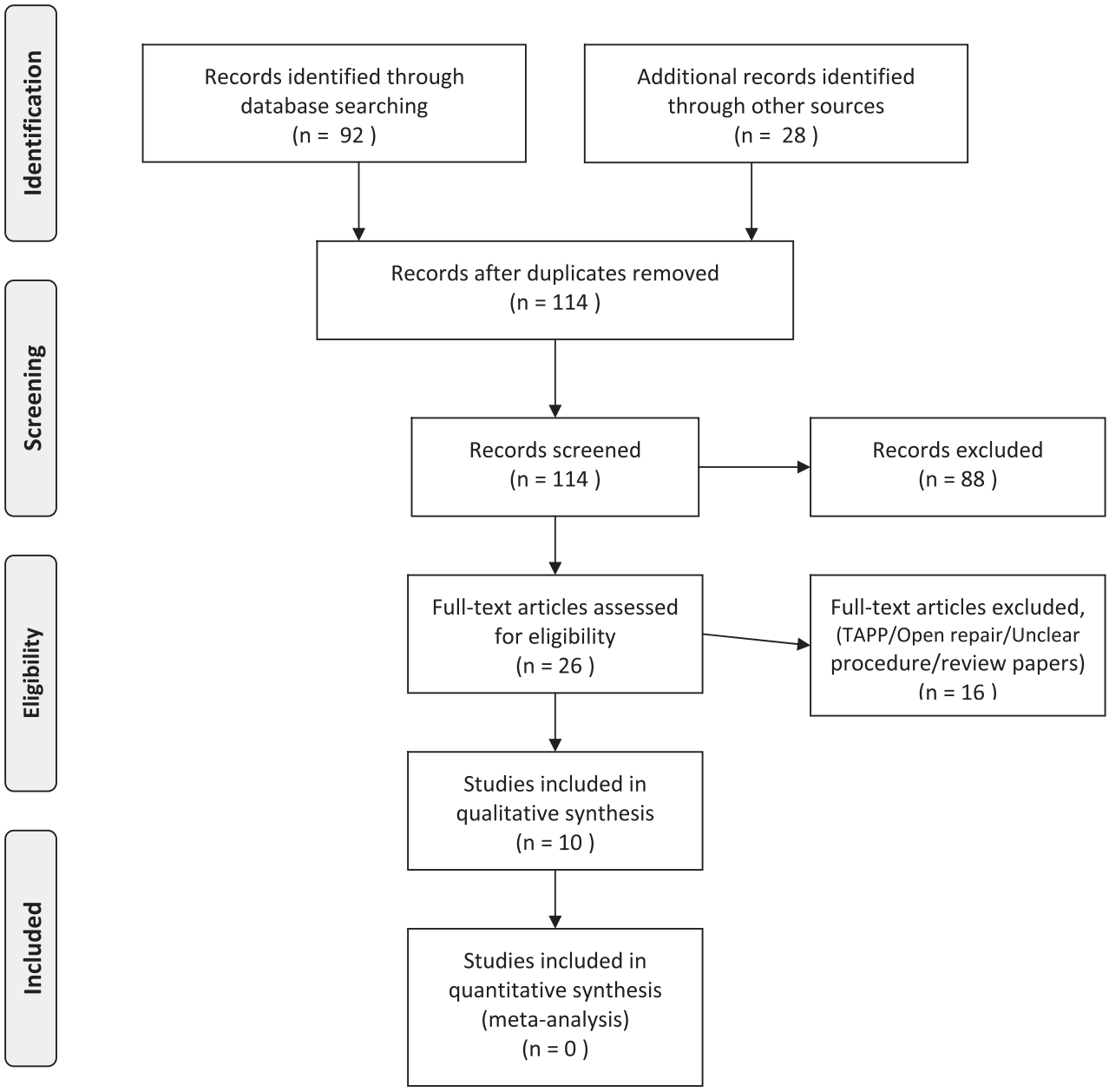

Fig. 1 Flow chart of literature search.

reports all patients returning to normal activities within a month; however, it was unclear as to whether this incorporated athletic activity.[23] Up to 53% of patients had persistence of symptoms at the early follow-up.[6,14,22–24,26] Total follow-up time ranged from 3 to 80 months,[6,9,14,23–26] and most patients were active (90%–100%). Three percent to 10% of patients[6,9,23,26] were unable to play and 5% were reported as being unable to train.[24]

Two studies from the same center reported on TEP surgery for osteitis pubis confirmed on MRI or bone scans.[2,27] In one study, 88% of patients returned to athletic activity after 8 weeks, 1 patient required repeat surgery for ongoing symptoms.[2] The other study reports all patients returning to sport activity after 4 to 8 weeks with no persistence of symptoms after 1 year follow-up.[27]

Discussion

The challenge of diagnosing sports hernias[28] is paralleled only by the debate surrounding the value and

Table 1 Patient Demographics

	Azurin *et al*[22]	Srinivasan *et al*[25,a]	Paajanen *et al*[24]	Kluin *et al*[6]	Susmallian *et al*[9]	Edelman *et al*[23]	van Veen *et al*[26]	Paajanen *et al*[14]
Patients	n = 8	n = 7 (15–8)[a]	n = 41	n = 10[b]	n = 35	n = 10	n = 55	n = 30
Age in years (range)	25.1 (22–30)	27.9 (23–34)	27 (20–34)	35 (20–55)	24.3 (17–29)	31.9 (19–44)	25 (17–36)	32 (SD 9)
Sex, m:f	All men	All men	All men	9:01	All men	9:01	53:02	25:05
Sports activity								
Football/soccer	1	5	24	4	35	2	47	SNR
Rugby/Am football	3	1	NR	0	0	0	0	0
Hockey	3	1	11	0	0	0	0	SNR
Bodybuilding	1	0	NR	0	0	0	0	0
Other	0	0	6	6	0	8	8	SNR
Preoperative imaging	None	None	MRI/XR/US/ CT/ Bone scan	XR/US/Bone scan	MRI/XR/Bone scan	XR/US	MRI/XR/US/ Bone scan	MRI/XR/US/ CT/ Bone scan
Preoperative pain								
Type	NR	Pulling sensation	NR	NR	NR	NR	NR	Dull
Severity								
At rest	1	NR	41	0	NR	NR	NR	30
On movement	7	NR	0	10	NR	NR	55	NR
Normal activity	1	NR	0	NR	6	NR	8	NR
Athletic activity	4	NR	0	NR	NR	NR	47	0
Other: *e.g.*, valsalva/ palpation	2	NR	0	NR	NR	NR	39	NR
Duration	Range, 2 mo to 4 y	Range, 1–4 mo	Mean, 9.2 mo (SD, 9.1 mo)	Range, 3 mo to >12 mo	6–12 mo	NR	3 mo to >6 mo	13 mo (SD 4)
Site								
Groin	8	NR	41	10	35	NR	48	30
Lower abdomen	4	NR	NR	NR	NR	NR	7	SNR
Pubic bone	0	NR	NR	1	NR	NR	7	NR
Bilateral	1	NR	4	2	NR	NR	13	13
Conservative treatments (n)	A, B, C, D, E (7)	NR	A, B, C (41)	C, F (10)	NR	A, B, C	B, C, D	NR
Duration in months	Several episodes	NR	NR	>3	NR	NR	>3 mo	NR
Clinical findings								
Painful side(s)								
Direct hernia	1	NR	NR	0	0	0	NR	NR
Indirect hernia	7	NR	NR	0	3	0	NR	NR
Femoral hernia	0	NR	NR	0	0	0	NR	NR
Dilated int ring	7	NR	NR	0	NR	0	NR	NR

Table 1 continued

	Azurin *et al*[22]	Srinivasan *et al*[25,a]	Paajanen *et al*[24]	Kluin *et al*[6]	Susmallian *et al*[9]	Edelman *et al*[23]	van Veen *et al*[26]	Paajanen *et al*[14]
Nil obvious	0	NR	NR	10	32	10	53	NR
Contralateral side								
Direct hernia	0	NR	NR	0	NR	NR	NR	NR
Indirect hernia	2	NR	NR	0	NR	NR	NR	NR
Femoral hernia	0	NR	NR	0	NR	NR	NR	NR
Dilated int ring	6	NR	NR	0	NR	NR	NR	NR
Nil obvious	1	NR	NR	2	NR	NR	NR	NR
Degree of disability								
Unable to do normal activity	0	NR	0	NR	6	NR	NR	NR
Unable to train	2	NR	24	NR	NR	NR	NR	21
Unable to play	4	NR	17	10	NR	NR	NR	NR
Not mentioned	2	7	0	0	29	10	55	9

m:f, male:female; SD, standard deviation; Am, American; SNR-Specific number not recorded (Overall figures in manuscript); NR-Not recorded; A-Steroids; B-Physiotherapy; C-Periods of rest; D-NSAIDS; E-Hydrotherapy; F-Others not specified; int, internal.

[a]Cases selected to avoid duplication.

[b]Cases selected to exclude TAPP.

timing of operative intervention.[5,29] A general agreement surrounds the need for operative intervention when a macroscopic abnormality is noted in an athlete with groin pain. However, when there are equivocal clinical findings, most authors suggest a conservative approach initially,[12,28] which may help, but long-term outcomes are debatable.[30] When conservative measures fail, then diagnostic TEP, which often shows a pathology in 80% of patients,[25] should be utilized. Imaging may be useful to exclude other differentials, but a negative scan may not be conclusive as a tiny tear may be missed.[23] When no pathology is identified, using a posterior wall–strengthening mesh helps, presumably by treating an occult injury.[6,26] Recent evidence suggests that operative intervention could be considered the first line for chronic groin pain in athletes.[14,31]

MRI may be useful in diagnosing osteitis pubis, the degree of which does not necessarily correlate with symptoms. Furthermore, the clinical scenario is very similar to sports hernias and responds equally well to surgical intervention. It has been suggested that in some cases it may be part of the same disease entity.[27]

In our review, most of the patients included in the studies were men, women making up only 5% of treated athletes.[2,6,9,14,23–26] Some have postulated that women athletes tend to have more persistent symptoms and have other pathologic processes contributing to their pain.[6,15] However, this was not the case in other studies.[23,26]

Our review suggests that athletes undergoing TEP repair do well in the early and long-term postoperative period, even when a macroscopic abnormality is not detected, which is in keeping with the idea that strengthening the posterior wall relieves symptoms.[6,26] Typically most patients returned to full sporting activity by 6 weeks (Table 2), which contrasts with the reported recovery time of 3 months after open procedures.[25,32,33] Given that most athletes are concerned about recovery time after surgery,[22] the laparoscopic approach may be the more suitable approach.[28] Other approaches such as TAPP repairs may be equivalent in terms of outcomes[32,34]; however, TEP may offer advantages such as less pain[20] and lower risk of injury to intra-abdominal viscera; TEP may be challenging or inappropriate in other circumstances, as in patients with previous abdominal surgery or the need for prostate surgery.[35] Further developments, especially in relation to cosmesis, include single-port surgery but may take longer to perform than standard TEP repairs.[36]

Table 2 Surgical Characteristics and Outcomes

	Azurin *et al*[22]	Srinivasan *et al*[25,a]	Paajanen *et al*[24]	Kluin *et al*[6]	Susmallian *et al*[9]	Edelman *et al*[23]	van Veen *et al*[26]	Paajanen *et al*[14]
Patients	n = 8	n = 7 (15 − 8)[a]	n = 41	n = 10[b]	n = 35	n = 10	n = 55[c]	n = 30
Surgical technique								
Extraperitoneal space formation	Balloon	Balloon	Balloon	NR	Balloon	Balloon	NR	Balloon
Pressure	12	12	NR	NR	NR	NR	NR	NR
Mesh type	Polypropylene	Polypropylene	Polypropylene	Polypropylene	Polypropylene	Biological	Polypropylene	Polypropylene
Tacks/glue	Tack	Tack	Tack/glue	Nil	Tack	Tack/glue	Tack/nil	Tack
Conversion	0	0	NR	0	0	0	0	0
Tenotomy	0	0	2	0	0	0	4	6
Operative data								
Time (min)	55.3	27 (unilat)/ 55 (bilat)	NR	NR	17–45	20–60	NR	45 ± 13
Findings								
Painful side(s)								
Direct hernia	0	0	0	6	NR	4	39	0
Indirect hernia	8[d]	6	0	2	4	6	17	0
Femoral hernia	1[d]	0	0	3	0	0	0	0
Dilated int ring	7	6	0	NR	28	0	NR	NR
Nil obvious	0	0	24	0	3	1	0	30
Other	0	1	17	1	0	0	0	0
Contralateral side								
Direct hernia	0	0	NR	NR	NR	NR	NR	NR
Indirect hernia	7	3	NR	NR	NR	NR	NR	NR
Femoral hernia	0	0	NR	NR	NR	NR	NR	NR
Dilated int ring	7	3	NR	NR	NR	NR	NR	NR
Nil obvious	1	4	NR	NR	NR	NR	NR	NR
Complications	0	0	0	0	NR	1	1	1
Analgesia								
Type	Oral narcotic	Oral narcotic	Oral simple analgesics/ NSAIDs	NR	NR	Oral narcotic/ simple analgesics	NR	Oral simple analgesics/ NSAIDs
Number of days	All patients off analgesics at 3 days	All patients off analgesics at 3 days	NR	NR	NR	NR	NR	NR
Return to function								
Time to mobilization	All at 24 h	All at 24 h	NR	NR	NR	NR	NR	NR
Time to normal activities	NR	All at 24 h	NR	NR	NR	SNR	NR	NR
Time to recreational activities	All at 1 week	NR	NR	NR	NR	SNR	NR	NR
Time to training	All at 2 weeks	NR	NR	NR	NR	SNR	NR	NR
Time to full sport activity	All at 2–3 weeks	All at 6 weeks	93% At 4 weeks	SNR	NR	SNR	88% 6-8 weeks	90% At week 12

Table 2 continued

	Azurin *et al*[22]	Srinivasan *et al*[25,a]	Paajanen *et al*[24]	Kluin *et al*[6]	Susmallian *et al*[9]	Edelman *et al*[23]	van Veen *et al*[26]	Paajanen *et al*[14]
Follow up								
Total time	6–34 min	6–80 min	51 ± 22 min	12 min	14.6 min	12 min	3 min	12 min
Early 3–6 week follow-up								
Pain severity	Minimal	NR	Minimal	SNR	NR	NR	NR	Mild
Impaired peak activity	0	NR	7%	SNR	NR	SNR	NR	33%
Persistence of symptoms	0	NR	5%	SNR	NR	1	1	53%
Long-term follow-up	NR	All active	All active	90% Active	97.1% Active	90% Active	91% Active	97% Full activity
		No symptoms	5% Symptoms in training	10% Unable to play	2.9% Unable to play	10% Unable to play	9% Impaired activity	
Recurrence	0	NR	0	0	NR	NR	0	NR

Unilat, unilateral; bilat, bilateral; NSAID, nonsteroidal anti-inflammatory drug.

[a]Cases selected to avoid duplication.

[b]1 patient had a femoral and inguinal hernia.

[c]Cases selected to exclude TAPP.

[d]56 repairs in 55 patients.

NR-Not recorded.

SNR-Specific number not recorded (overall figures in manuscript).

Because of the spectrum of challenges involved when treating sports hernias, it is important to ensure that a specific patient-centered, multidisciplinary approach is used,[10,37] and that may involve tenotomy for adductor type pain.[14,24,26] Furthermore, should a TEP repair be performed prophylactically in patients with asymptomatic contralateral groins?[38]

A paucity of studies exists regarding TEP repair and sports hernias. The current evidence would suggest a short trial of conservative treatment followed by surgery, provided no other pathology requiring other interventions is identified on imaging studies.

Conclusions

TEP repair is a good operative intervention in athletes with chronic groin pain not relieved by conservative measures. Athletes recover quickly and return to sport early. A paucity of literature necessitates caution when considering treatment.

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