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Case Series

Ultrasound-guided Transmuscular Quadratus Lumborum Block with Depot Steroids in the Management of Abdominal Myofascial Pain Syndrome

Gopinath Niraj, FFPMRCA

Background: Trigger point injection is the current standard in the management of abdominal myofascial pain syndrome (AMPS). However, multiple trigger point injections can cause significant discomfort and there is a possibility of missing trigger points resulting in a reduced efficacy of trigger point treatment. Recently, abdominal wall blocks have been reported in the management of chronic abdominal wall pain. Transmuscular quadratus lumborum block (TQLB) is a novel abdominal wall block.

Objective: The report describes the role of the ultrasound-guided TQLB with depot steroids in the management of AMPS.

Study Design: Prospective case series.

Setting: Tertiary pain medicine clinic in a University Hospital.

Methods: Adult patients with AMPS under the care of a single physician were offered TQLBs with a mixture of local anaesthetic and depot methylprednisolone instead of multiple trigger point injections as a part of an on-going prospective longitudinal audit into the management of AMPS. Patients completed brief pain inventory questionnaire at baseline and at 12 weeks post-procedure.

Results: Thirty patients underwent TQLB. All patients reported complete absence of pain within 15 minutes of the block and sensory testing revealed extensive hypoaesthesia extending from thoracic T6 to T12 anteriorly. Clinically significant benefit at 12 weeks was reported by 36% of patients, with 60% (18/30) of the patients preferring to receive the novel intervention instead of multiple trigger point injections. None of the patients reported post-procedural flare up.

Limitations: Open label case series in a small cohort.

Conclusion: The prospective series in a limited cohort suggests that TQLB with depot steroids could play a role in the management of AMPS.

Key words: Abdominal myofascial pain syndrome, transmuscular quadratus lumborum block, trigger point treatment, nonspecific abdominal pain, viscerosomatic convergence

Abdominal myofascial pain syndrome (AMPS) is a poorly recognised cause of chronic abdominal wall pain (CWAP) (1). Failure to correctly diagnose and manage AMPS can result in unnecessary investigations, including surgery and unsatisfactory outcomes with significant health care costs (2-4).

Author for correspondence: Gopinath Niraj, FFPMRCA
Address: Consultant, Department of Anaesthesia and Pain Medicine, Honorary Senior Lecturer, University of Leicester, Clinical Research Unit in Pain Medicine, University Hospitals of Leicester, Gwendolen Road, Leicester, LE5 4PW
E-mail: nirajgopinath@yahoo.co.uk

AMPS develops as a result of trigger points in the abdominal musculature. Trigger points in the abdominal wall muscles can develop as a result of both central and peripheral sensitisation caused by underlying visceral inflammation. This phenomenon is termed viscerosomatic convergence (1,2,5,6). Initial diagnosis is by eliciting Carnett's sign on clinical examination (1,7). The diagnosis is usually confirmed on having a positive response to trigger point injection (TPI) (1,3,8,9). TPI is performed using either a landmark technique (blind) or under ultrasound guidance (9,10). Often patients require injections into multiple trigger points and this could result in significant discomfort during the proce-

dure as well as prolonged post procedural flare up (1). Abdominal wall blocks including transversus abdominis plane (TAP) have been reported in the management of CAWP (11-14). Transmuscular quadratus lumborum block (TQLB) is a novel abdominal wall block where the local anaesthetic agent is deposited in a fascial plane between the quadratus lumborum (QL) and psoas major muscles (15). TQLB has been reported to result in an extensive thoraco-lumbar sensory block (16,17). The author presents the first report on the use of ultrasound guided TQLB with a mixture of local anaesthetic agent and depot steroid in the management of AMPS.

METHODS

Adult patients diagnosed with AMPS under the care of a single pain physician based in a tertiary pain medicine service were offered TQL block with a mixture of local anaesthetic and depot steroid as an alternative to multiple TPIs as a part of an on-going prospective audit into the management of AMPS (1). Diagnostic criteria for AMPS included (1):

History

Constant dull achy pain in the abdomen with intermittent sharp flare-ups, referred to the flank, groin or the leg; aggravated on activity, relieved on curling up and a past history of visceral inflammation.

Examination

Tender trigger points not localized to the lateral border of the rectus abdominis muscle, absence of cutaneous allodynia or hypoaesthesia and a positive Carnett's sign.

TQLB is a recently described novel abdominal wall block with an extensive sensory block (15,16). Abdominal wall blocks, including TAP blocks, are currently used in the management of AMPS at the author's centre. The author has experience of performing abdominal wall blocks, including TQLB in the perioperative setting (17). Patients with multiple trigger points (> 5 triggers) who had previously undergone ultrasound guided TPI were offered the novel block instead of multiple TPIs.

The objective was to identify if TQLB with depot steroids could reduce patient discomfort, reduce incidence of post procedural flare up, and provide an improved therapeutic benefit at 12 weeks following treatment. Informed consent was obtained prior to the procedure. Patients were given detailed information on the technique, potential risks and the objective for offering a novel procedure (reduced discomfort). All patients provided written consent for their de-identified data to be used for analysis and for publication in a peer reviewed journal.

Patients received ultrasound guided TQLB with a mixture of local anaesthetic and depot steroids. Patients with unilateral TQLB received 10 mL of 0.5% levo-bupivacaine and 60 mg of depot methylprednisolone. Patients having bilateral TQLB received 10 mL of 0.5% levo-bupivacaine and 40 mg of depot steroid on each side. Dermatomal sensory testing with ethyl chloride spray was performed at 15 minutes post-procedure. Following TQLB, a specialist nurse in pain medicine followed up the patients over telephone at 12 weeks.

Patients completed Brief Pain Inventory Short Form (BPI-SF) and quality of life (EQ 5D) questionnaires at baseline and at 12 weeks after treatment (returned by post). Clinically significant pain relief was defined using the 'pain at its worst in the last 24 hours' construct in the BPI-SF questionnaire. This 11-point pain intensity Numeric Rating Scale (NRS-11) has been found to have the strongest relationship with the pain interference scale (18,19). Following IMMPACT recommendations (Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials), a 2-point change (30-36%) at 12 weeks post treatment was considered as successful therapeutic intervention (20). Missing data was imputed using the 'last-observation-carried-forward' method.

Technique

The patient is positioned in the lateral position on a flexed operating table (open nephrectomy position). The skin is prepared with 2% chlorhexidine solution and sterile drapes placed to create an aseptic field. A high frequency (5-10 MHz) ultrasound probe (S Nerve, Sonosite, Inc. Bothwell, USA) is placed transversely in the anterior abdominal wall to identify the rectus muscle and then, the 3 lateral abdominal muscles (external oblique, internal oblique, and transversus abdominis). The probe is gradually

moved posterolaterally to identify the QL muscle and thereafter, the plane between the QL muscle and the psoas major muscle (Fig. 1). A 100 mm needle (Stimuplex, B Braun) is introduced in the plane of the ultrasound beam and directed towards the plane traversing the QL muscle. On entering the fascial plane, 5 mL of normal saline 0.9% is injected to open the plane (saline hydro-dissection). The injectate can be observed spreading in the TQL plane as a dark oval shape (Fig. 2). Thereafter, the mixture of local anaesthetic and depot steroid is injected. The procedure is repeated on the other side if required.

RESULTS

Over a 9-month period, 30 patients with AMPS were offered TQLB with depot steroids instead of repeat multiple TPIs. All patients had over 5 trigger points and had previously received TPI with depot steroids. The novel treatment was performed only after the pain had returned to the baseline following TPI. Four patients had features of postsurgical neuropathic pain (liver resection, mesh hernia repair, laparoscopic appendectomy) in addition to myofascial trigger points. Two patients were lost to follow-up.

Ultrasound guided TQLB was performed in all patients. Twenty-one patients required a unilateral block, while 9 patients received bilateral TQLB. TQLB provided complete relief within 15 minutes in all patients. Sensory testing with ethyl chloride spray revealed hypoaesthesia extending from the thoracic T6 to T12 dermatome in the anterior abdominal wall. Dermatomal testing along the lateral and posterior abdominal wall revealed hypoaesthesia extending posteriorly over the QL muscle. There was no change in sensation over the lumbar dermatomes.

All patients tolerated the procedure under local anaesthetic and did not require additional sedation. All patients found TQLB to be a superior procedure to tolerate.

Clinically significant pain relief at 3 months following TQLB was reported by 36% (11/30) of the responders (Table 2). Relief was short lived (< 2 weeks) in 3 patients with postsurgical neuropathic scar pain. They reported superior benefit with TPIs.

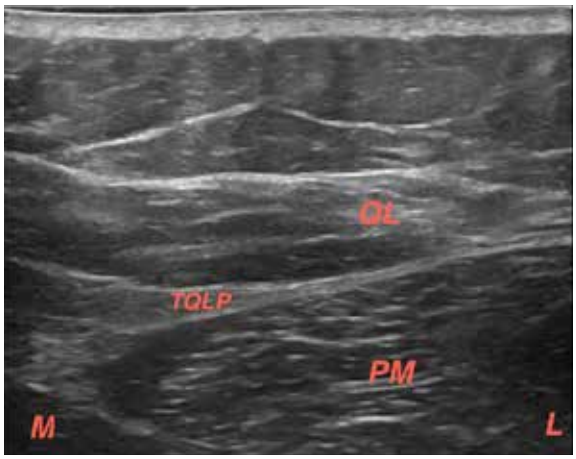

Fig. 1. The transmuscular quadratus lumborum plane between the QL and psoas major muscles.

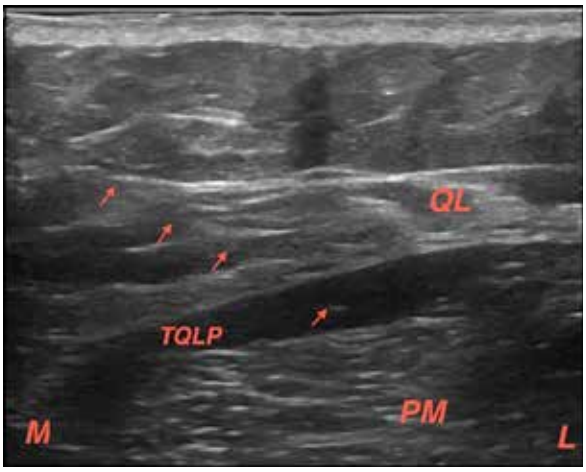

Fig. 2. Hydro dissection of the transmuscular quadratus lumborum plane with normal saline. Arrows indicate the needle.

Trigger points were localized in the lower quadrant on the abdomen in a majority of patients (25/30). It was observed that patients who reported the most durable benefit had their pain localized to the lower abdomen. Five patients with pain localized in the upper quadrant reported transient benefit with TQLB when compared to TPI.

Quality of life (EQ-5D) scores are reported based on the Pareto Classification of Health Change (PCHC) (21). PCHC classifies change in health following an

Table 1. Patient characteristics and duration of relief following TQLB.

Patient ID	Gender, Age (year)	Duration of pain (year)	Unilateral / Bilateral	Primary visceral inflammation	Duration of 30% Relief with TQLB	Superior Treatment
1	F, 66	10	U	Pancreas	5 weeks	TPI
2	F, 32	2	U	Endometriosis	12 weeks	TQLB
3	F, 24	5	U	GU Tract	8 weeks	TQLB
4	F, 23	1	B	GU Tract	12 weeks	TQLB
5	M, 29	1	U	GU Tract	8 weeks	TQLB
6	F, 38	3	U	Appendicitis	5 weeks	TPI
7	M, 64	5	U	GU Tract	12 weeks	TQLB
8	F, 34	1	B	GU Tract	8 weeks	TQLB
9	F, 33	2	B	GU Tract	12 weeks	TQLB
10	F, 63	2	U	Biliary	12 weeks	TQLB
11	F, 59	3	U	Biliary	5 weeks	TQLB
12	F, 35	2	U	Biliary	5 weeks	TQLB
13	F, 27	5	U	GU Tract	6 weeks	TQLB
14	M, 30	4	U	Pancreas	8 weeks	TQLB
15	F, 39	1	U	Biliary	12 weeks	TPI
16	F, 48	1	U	Biliary	12 weeks	TQLB
17	M, 54	8	U	Pancreas	1 week	TPI
18	F, 28	3	B	Endometriosis	1 week	TPI
19	F, 53	2	U	Liver Resection	1 week	TPI
20	M, 55	2	U	GU Tract	LFU	LFU
21	F, 30	1	B	Pancreas	4 weeks	TPI
22	F, 41	4	U	Endometriosis	1 week	TPI
23	M, 50	4	U	GU Tract	12 weeks	TQLB
24	F, 72	5	B	GU Tract	12 weeks	TQLB
25	F, 32	4	U	Endometriosis	12 weeks	TQLB
26	F, 43	4	U	Unclear	LFU	LFU
27	F, 29	3	B	Endometriosis	4 weeks	TPI
28	F, 50	1	B	Peritonitis/surgery	5 weeks	TQLB
29	M, 36	16	B	GU Tract	5 weeks	TQLB
30	F, 46	3	U	Unclear	4 weeks	TPI

TQLB = transmuscular quadratus lumborum block, GU Tract = genitourinary tract, TPI = trigger point injection, LFU = Lost to follow-up

intervention into 4 categories: health is better, same, worse, or mixed (better in one dimension, worse in another dimension) (Table 1).

TQLB was found to be a superior technique for providing pain relief by 60% of patients (18/30). Post-procedural flare up in pain lasting over 48 hours was reported by 39% (12/30) of patients following TPI, while none of the patients with TQLB reported post procedural flare up.

DISCUSSION

The author presents the first report on the use of ultrasound guided TQLB in the management of AMPS. TQLB with depot steroids provided on going relief at 12 weeks in 36% patients in this series. The current standard intervention in the diagnosis and management of AMPS is TPI (1-4,9). Patients usually require multiple injections (1,2,10). This can result in significant distress, increases risk of visceral injury, especially if the procedure is performed using

Table 2. Brief pain inventory short form (BPI-SF) scores and quality of life (Euro-QoL) at baseline and at 12 weeks post TQLB and trigger point injection.

Patient ID	Baseline Worst Pain Score in 24 h TQLB	12 weeks Worst Pain Score in 24 h TQLB	12 weeks EQ-5D TQLB	Baseline Worst Pain Score in 24 h TPI	12 weeks Worst Pain Score in 24 h TPI	12 weeks EQ-5D TPI
1	9	8	Same	10	9	Same
2	6	2	Better	5	7	Same
3	9	9	Same	9	8	Same
4	6	2	Better	9	4	Better
5	8	7	Same	10	9	Worse
6	7	7	Worse	10	3	Better
7	6	3	Better	10	4	Better
8	8	7	Better	9	8	Same
9	8	6	Better	7	7	Better
10	5	0	Better	8	7	Worse
11	8	7	Worse	8	9	Same
12	10	8	Same	10	10	Worse
13	9	7	Same	8	8	Better
14	9	7	Better	7	8	Better
15	9	10	Same	10	7	Better
16	8	5	Better	9	7	Better
17	9	9	Worse	9	0	Better
18	8	10	Worse	10	6	Better
19	8	9	Same	10	9	Same
20	5	LFU	Same	6	5	LFU
21	6	6	Same	6	0	Same
22	9	9	Same	8	8	Same
23	8	2	Better	8	5	Better
24	8	6	Better	8	4	Same
25	10	6	Better	6	4	Same
26	8	LFU	Same	8	9	LFU
27	7	6	Better	8	7	Same
28	7	7	Same	8	8	Better
29	9	9	Same	10	9	Same
30	8	8	Same	6	2	Better

LFU = lost to follow up, TQLB = transmuscular quadratus lumborum block, TPI = trigger point injection

a landmark technique, and there is a possibility of missing trigger points in the muscle. Myofascial trigger points have been described in various muscles that form the anterior and posterior abdominal wall. TQLB involves a single ultrasound guided injection and it has been reported to provide sensory block of the entire hemi-abdomen (15-17).

An alternative technique recommended in the management of CWAP is the TAP block (11-14). Two types of TAP blocks have been described (22-24). The subcostal TAP block covers the thoracic dermatomes from T6 to T10. Subcostal TAP block does not reliably cover dermatomes below T10 (22,23). The posterior TAP block provides sensory block to the lower abdomen (dermatomes T10-L1). Posterior TAP block does not reliably cover dermatomes above T10 dermatome. The presence of this watershed

zone at T10 dermatome has been confirmed by both anatomical and clinical studies (24,25). Thus, in the presence of trigger points in both the upper and lower abdomen, a single TAP block will not cover the area involved in pain generation. Ten patients in our series with unilateral abdominal pain had trigger points in the upper and lower abdomen. The sensory block from TAP blocks does not extend beyond the anterior axillary line. Thus, posterior TAP block will not cover trigger points in the QL muscle. Seven patients in this series had trigger points in the QL muscle. It can be challenging to perform TAP blocks in patients who have had surgical procedures on the abdomen as the fascial planes can be disrupted. Two patients in this series had surgical procedures with tissue plane disruption (pancreatic surgery, liver resection).

TQLB has been reported to provide extensive sensory blockade of the hemi-abdomen and is performed away from the potential trigger points. It can cover trigger points in the posterior abdominal wall, including the QL muscle. There is evidence that shows the extent of sensory blockade following TQLB (16,17). In the current series, sensory testing revealed hypoaesthesia extending from the thoracic T6 to T12 dermatomes. This observation confirms the paravertebral site of action.

Current therapeutic standard in the management of AMPS is TPI with a mixture of local anaesthetics and depot steroids. The average duration of relief following abdominal TPI is reported to range from 6 to 12 weeks (9,26). TQLB provided on going relief at 12 weeks in 36% of patients. This is similar to the 43% reported by Alnahhas et al (9) in their series following ultrasound guided TPI. Patients with features of neuropathic pain may obtain a transient relief following TQLB with steroids. Patients with trigger points in the upper abdomen reported transient relief following TQLB.

AMPS is a common and often unrecognized clinical entity that can utilise significant health care costs (2,3). This report in a limited cohort suggests ultrasound guided TQLB as an alternative technique to TPI in the management of AMPS. Initial findings suggest that patients with pain localized to the lower abdomen including the flank may benefit from TQLB. Patients with pain localized to the upper abdomen may receive greater benefit from either TPI or if the fascial planes are preserved, a subcostal TAP block (14). Patients with co-existent post surgical neuropathic pain may benefit from targeted injection of depot steroid into the muscle. A major advantage of utilising abdominal field blocks like TQLB and subcostal TAP include a definitive visible end point (opening of the facial planes) when compared to TPIs (Fig. 2). This may enhance standardization for future studies in the management of AMPS. Further work is required to confirm the therapeutic benefit of TQLB in the management of AMPS.

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