

Ultrasound-Guided Hydrodissection in the Management of Pain Associated with Desmoid Tumour

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Abstract

Background: Desmoid tumours are intermediate, locally aggressive tumours that lack metastatic potential but can significantly impact quality of life. Pain is a common presentation. Hydrodissection is an ultrasound-guided technique in which fluid is injected to create separation between nerves or other anatomical structures and the surrounding soft tissues. Its use in pain associated with desmoid tumours has not previously been described. **Case Presentation:** We report the case of a 47-year-old female with a sacroiliac junction desmoid tumour. Despite 18 months of conservative therapies, including NSAIDs, opioids, and physical therapy, she continued to experience sacroiliac junction pain. The desmoid tumour had been treated with cryotherapy. The patient underwent ultrasound-guided hydrodissection as a targeted approach to address perineural inflammation and nerve entrapment. 15 mL 5% dextrose solution and 5 mL 0.25% levobupivacaine were used to free the desmoid tumour from surrounding scar tissue and muscle adhesions. The procedure was performed in a theatre setting. **Results:** Following the hydrodissection procedure, the patient experienced significant pain improvement, which was sustained at two-month follow-up. Functional outcomes, including range of motion and activities of daily living, improved substantially, with no further analgesic requirement at follow-up. No complications were reported. **Conclusions:** This case suggests that hydrodissection may have a role as a minimally invasive treatment for pain associated with desmoid tumours. No procedure-related complications were observed in this case, and further study is required to evaluate its role in this setting.

Keywords

Desmoid Tumour, Pain, Hydrodissection, Ultrasound

1. Background

Desmoid tumours, also known as desmoid-type fibromatosis, are rare-fibroblastic soft-tissue tumours characterised by infiltrative growth and tendency to recur locally [1]. Although they do not metastasise, they may arise in extra-abdominal, abdominal wall or intra-abdominal locations [1]. Despite their lack of metastatic potential, desmoid tumours can cause significant morbidity including pain, deformity, impaired mobility, and reduced quality of life [1] [2]. The estimated incidence of desmoid tumours is approximately 2 - 5 cases per million population per year [3]. Desmoid tumours account for less than 3% of soft tissue neoplasms [3] [4]. Most cases occur sporadically, while a smaller proportion are associated with familial adenomatous polyposis [1]. Sporadic tumours are associated with somatic CTNNB1 mutations affecting beta-catenin signalling [5]. Abnormal activation of the Wnt/ β -catenin pathway is regarded as a central molecular feature of desmoid tumour development, and CTNNB1 mutations have been associated with tumour behaviour and recurrence risk [5].

The clinical course of desmoid tumours is variable and can be difficult to predict [6]. Some lesions regress spontaneously, some remain stable, and others progress locally [6]. This variable natural history has contributed to a shift away from routine surgery towards surveillance in selected patients [4] [7]. Active treatment is generally considered for progressive or symptomatic tumours [4] [6] [8] [9]. Surgical excision was previously regarded as the standard treatment for desmoid tumours, however, high recurrence, and greater understanding of the variable natural history of the disease, have led to increased use of active surveillance and multidisciplinary management strategies [3]. Pain and impaired mobility are common causes of disease burden in patients with desmoid tumours [1] [10]. Quality of life may be reduced by chronic pain, functional limitation, sleep disturbance, and psychological distress [1] [2]. Management therefore requires an individualised, multidisciplinary approach that considers tumour location, symptom burden, treatment-associated morbidity risk, and patient preference [4] [8] [11]. Symptoms may result from local infiltration or compression of adjacent muscles, nerves and other structures, and therefore may not be fully represented by tumour dimensions alone [1]. As a result, treatment decisions are guided by symptom burden and quality of life rather than tumour size alone [4] [11].

Treatment options for desmoid tumours include active surveillance, systemic therapy, surgery, radiotherapy, and image-guided interventions [4] [9]. Among minimally invasive approaches, cryotherapy has become an important option for selected extra-abdominal desmoid tumours [4] [9] [12]. It has been associated with symptom relief, tumour regression and disease stabilisation [6]. Cryoablation may provide local tumour control while avoiding some of the morbidity associated with major surgery, and published series have reported improvements in pain, function, and symptom burden following treatment [6] [13] [14]. This may be particularly relevant for tumours close to critical anatomical structures, or in patients for whom surgery would carry a high risk of functional impairment [6] [14].

Hydrodissection is a minimally invasive ultrasound-guided intervention involving injection of fluid to separate nerves and tendons from surrounding fascia, or adjacent anatomical structures [15] [16]. Its proposed effects include mechanical separation of tethered tissues and reduction of compression of the nervi nervorum and vasa nervorum [15]-[17]. Ultrasound guidance allows real-time visualisation of target structures, needle placement, and spread of injectate [15] [18]. Within pain medicine, hydrodissection has been used in peripheral nerve entrapment syndromes and other chronic pain conditions associated with scar tissue formation or fascial adhesions. The technique has been reported in conditions including pudendal neuralgia, pronator teres syndrome, deep gluteal syndrome, and intersection syndrome [16] [18] [19]. Dextrose hydrodissection has also been proposed as a means of reducing neuropathic pain, possibly through modulation of neurogenic inflammatory mediators such as calcitonin gene-related peptide [17] [18] [20]. In addition to its mechanical action, 5% dextrose solution may have analgesic effects through reduction of neurogenic inflammation and peripheral nerve sensitisation. This has contributed to its increasing use as an injectate for ultrasound-guided hydrodissection procedures [16] [18] [20]. Previous reports describe ultrasound-guided hydrodissection as a safe and minimally invasive approach for chronic pain and entrapment syndromes [18] [19]. As a result, hydrodissection is being explored in an increasing number of musculoskeletal and neuropathic pain conditions [16] [21]. However, its use in pain associated with desmoid tumours has not been previously reported. Where pain persists despite tumour-directed treatment, hydrodissection may offer a means of addressing adhesions, tissue tethering and possible neural irritation [21].

The use of ultrasound-guided hydrodissection for pain associated with desmoid tumours has not been previously reported. In this report, we describe the case of a 47-year-old female with persistent sacroiliac junction pain associated with a desmoid tumour who was treated with ultrasound-guided hydrodissection using 5% dextrose solution.

2. Case Report

A 47-year-old female presented with persistent sacroiliac junction pain associated with a desmoid tumour located at the sacroiliac junction. She reported gluteal pain and an impact on mobility. Neurological examination was normal. Desmoid tumour diagnosis was confirmed by magnetic resonance imaging (MRI) and histopathological biopsy nine months prior to Pain Clinic presentation. The pain had persisted despite conservative therapies, including pharmacological management (NSAID analgesics and opioids) and physical therapy for an 18-month period. Her baseline pain score was 8/10 on a numerical rating scale (NRS). The patient's symptoms were associated with impairment in range of motion and an effect on activities of daily living. The desmoid tumour had previously been treated with cryotherapy six months previously. However, the patient reported persistence of pain despite this intervention.

Given the persistence of symptoms, despite conservative management and previous cryotherapy, ultrasound-guided hydrodissection was selected as a targeted, minimally invasive intervention. The purpose of the procedure was to free the desmoid tumour from surrounding scar tissue and muscular adhesions. Ultrasound demonstrated a tissue plane between the tumour and surrounding soft tissues that was considered suitable for hydrodissection (**Figure 1**). The lesion measured approximately 2.5×1.5 cm at the time of intervention. The lesion was visualised clearly throughout the procedure, allowing continuous assessment of needle position and tissue plane separation.

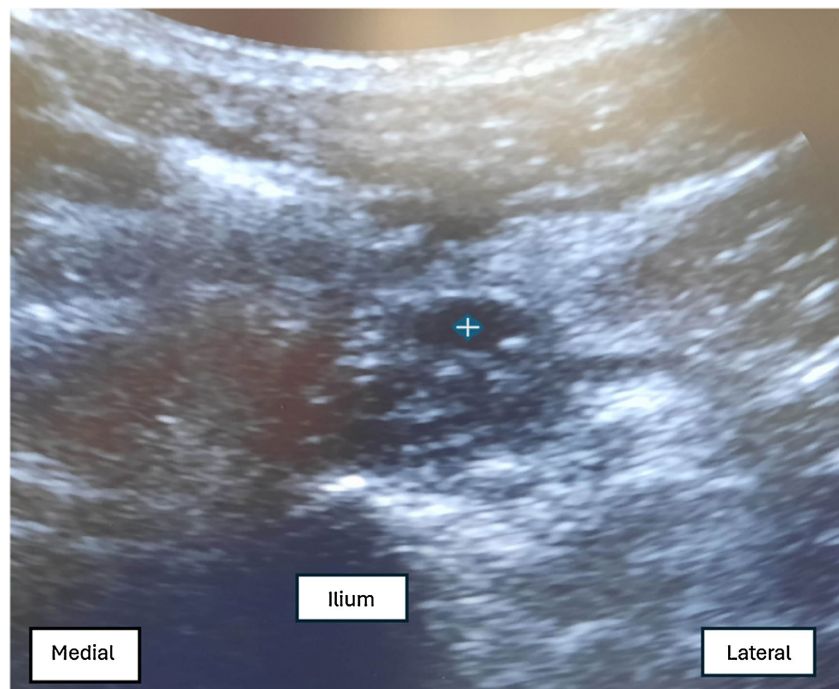


Figure 1. Pre-procedural ultrasound demonstrating the desmoid tumour (+) adjacent to the ilium prior to hydrodissection.

The procedure was performed in a theatre setting under aseptic conditions. The patient was placed in a prone position. A low-frequency curvilinear ultrasound transducer was used. Ultrasound guidance was used to visualise the lesion and guide accurate needle placement. A 22-gauge spinal needle was inserted using an in-plane approach from medial to lateral under continuous ultrasound guidance. Needle angulation was adjusted as required to achieve circumferential hydrodissection around the desmoid tumour. Before needle insertion, the skin was infiltrated with 0.25% levobupivacaine (Chirocaine) to provide local anaesthesia. The injectate consisted of 15 mL of 5% dextrose combined with 5 mL of 0.25% levobupivacaine (Chirocaine). Ultrasound demonstrated visible separation of the tumour from surrounding tissue during injection (**Figure 2**). This was planned as a single hydrodissection session, although repeat treatment remained a potential option depending on clinical response.

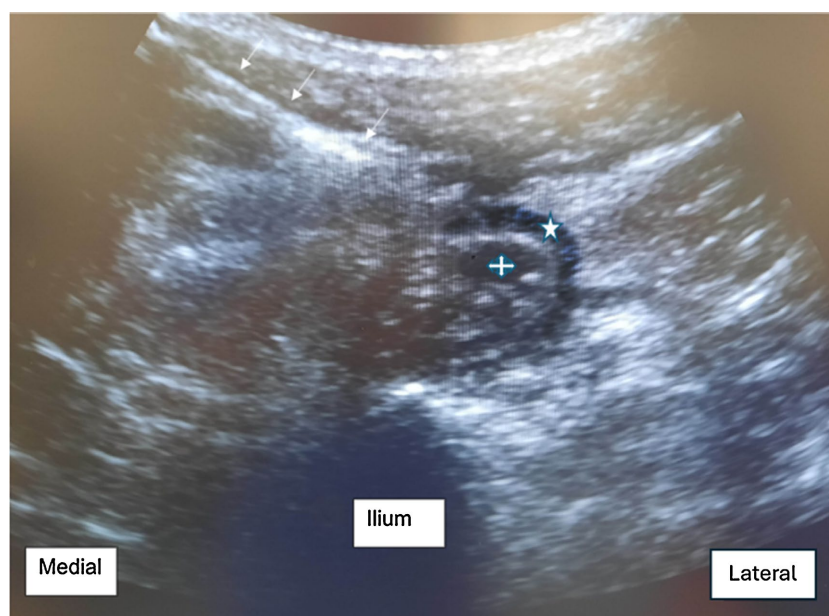


Figure 2. Ultrasound-guided hydrodissection. The arrows indicate needle insertion from medial to lateral. Hydrodissection superior to the desmoid tumour (+) is indicated by the star.

No immediate complications were reported following the procedure. Following hydrodissection, the patient experienced marked pain reduction, which was sustained at the 2-month follow-up. Her two-month follow-up pain score was 2/10 on a numerical rating scale (NRS) (previously 8/10 NRS) and no further analgesic medication was required. Functional outcomes, including range of motion and activities of daily living, also improved. Regular oral opioids were no longer required. The patient awaited further imaging of desmoid tumour.

3. Discussion

This case describes the use of ultrasound-guided hydrodissection for persistent pain associated with sacroiliac junction desmoid tumour. This is the first reported use of ultrasound-guided hydrodissection for pain associated with a desmoid tumour. Although desmoid tumours do not metastasise, they may cause considerable pain and functional impairment [1] [4]. Desmoid tumour management is challenging because of the unpredictable nature of the disease [1] [6]. Some tumours regress spontaneously, some remain stable, and others progress locally [6]. This variability has led to increasing use of active surveillance for minimally symptomatic or stable disease [4]. However, active treatment remains appropriate when symptoms are difficult to control, function is impaired, or tumour location creates risk of morbidity [4] [8] [11].

Pain is an important clinical problem in desmoid tumour disease [1] [2]. Patients with desmoid tumours frequently experience pain; impaired mobility, and reduced ability to perform activities of daily living [1] [10]. The impact of these symptoms on quality of life can be significant, and symptom severity does not

necessarily correlate with tumour size or disease progression [1] [2]. In the present case, pain persisted despite conservative management and previous cryotherapy. The persistence of symptoms after cryotherapy suggests that factors other than tumour size contributed to the patient's pain.

Image-guided interventions are increasingly used in the management of selected desmoid tumours [4]. These interventions may provide local tumour control while minimising morbidity and preserving function [4] [22]. Percutaneous ablative techniques have become an important consideration in the management of desmoid tumours [22]. Cryotherapy is one of the most widely utilised examples of these techniques and is commonly used in the management of extra-abdominal desmoid tumours [4] [6]. Tremblay *et al.* reported improvement of symptoms in 89% of patients with extra-abdominal desmoid tumours undergoing percutaneous cryoablation [13]. Similarly, Saltiel *et al.*, reported significant symptom relief associated with cryotherapy [14].

Pain associated with desmoid tumours may be related to scar formation, muscular adhesions, or fascial restriction causing nerve irritation [15]. Hydrodissection may therefore improve symptoms by releasing tissue adhesions and reducing nerve irritation [15] [17]. Hydrodissection differs fundamentally from cryotherapy, as it focuses on mechanical separation of tissues and reducing local compression rather than direct tumour ablation [6] [15]. The therapeutic benefits are thought to be associated with release of mechanical entrapment, reduction of compression on the nervi nervorum and vasa nervorum, and restoration of local blood supply [16] [21]. Ultrasound guidance allows for real-time identification of anatomical structures and continuous needle visualisation [15] [18]. In the present case, continuous ultrasound visualisation facilitated accurate needle placement and real-time assessment of tissue plane separation throughout the procedure. Ultrasound avoids the use of ionising radiation, while allowing for dynamic assessment of soft tissue structures during procedures [18]. Previous reports have described the successful use of ultrasound-guided hydrodissection in the management of neural entrapment and chronic pain [15] [18] [19]. These reports demonstrate that hydrodissection can be successfully applied in a variety of chronic pain conditions.

The use of 5% dextrose in hydrodissection is supported by medical literature [16] [18] [20]. In addition to its role in mechanical release of neural entrapment, it is proposed that dextrose may have an analgesic effect through modulation of neurogenic inflammation and reduction of peripheral nerve sensitisation [16] [17]. Dextrose hydrodissection has demonstrated adequate safety profiles across published studies [16] [20]. In a case reported by O'Donovan *et al.*, 5% dextrose was shown to provide substantial improvement of pudendal neuralgia without reported complications [18]. In the present case, 15 mL of 5% dextrose solution was used in a similar fashion to separate the desmoid tumour from surrounding scar tissue and muscular adhesions.

This case supports the role of hydrodissection as an adjunctive intervention for

pain management in selected patients with desmoid tumours. In the present case, clinically meaningful pain relief was achieved following a single hydrodissection session, although repeat treatment may be considered in selected patients depending on symptom recurrence or clinical response. This is particularly relevant in patients with persistent pain despite tumour-directed therapy [4]. Hydrodissection may provide a minimally invasive treatment option for carefully selected patients with persistent symptoms.

The principal limitation of this report is that it describes a single patient case report, therefore, case reports cannot determine causality or treatment efficacy. The follow-up period of 2 months is relatively short, and longer-term outcomes, including the durability of symptom relief and the potential need for repeat hydrodissection, remain unknown. Further studies involving larger patient cohorts and longer follow-up periods are required to establish the efficacy of this treatment. Future research should evaluate hydrodissection using standardised pain, functional and quality-of-life outcome measures to allow more consistent assessment of treatment response. Studies with longer follow-up are required to determine the durability of symptom improvement and whether repeat hydrodissection is required in selected patients. Comparative studies evaluating hydrodissection alongside cryotherapy and other image-guided interventions may help clarify its role within the management of symptomatic desmoid tumours, identify patients most likely to benefit, and inform future patient selection, and clinical decision-making.

4. Conclusion

Hydrodissection may represent a minimally invasive treatment option for selected patients with persistent desmoid tumour-associated pain, particularly when symptoms persist despite tumour-directed therapy. No procedure-related complications were observed in this case.

Author Contributions

K. D’Arcy contributed to the literature review, preparation and drafting of the manuscript. D. C. Harmon contributed to the clinical management of the patient, conception of the case report, supervision, and critical revision of the manuscript. Both authors reviewed and approved the final manuscript.

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Availability of Data and Material/Data Transparency

This case report is an honest, accurate and transparent account of the case being reported. No datasets were generated or analysed during this study. Further in-

formation is available from the corresponding author upon request, subject to patient confidentiality.

Ethics Approval

Formal institutional ethics committee approval was not required for this single-patient case report in accordance with institutional policy.

Consent to Participate

Written informed consent was obtained from the patient for participation in this case report.

Consent for Publication

Written informed consent for publication was obtained from the patient in accordance with institutional requirements.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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