Original article

Oblique “Scotty dog” versus antero-posterior (AP) views in performing x-ray guided facet joint injections[☆] K. Al-Tawil^{a,*}, D. Lopez^b, M. Blackman^c, S. Suresh^c^a Broomfield Hospital, Court Rd, Chelmsford, CM1 7ET, UK^b Cambridge University Hospitals, Hills Rd, Cambridge CB2 0QQ, UK^c Colchester General Hospital, Turner Rd, Colchester, Essex CO4 5JL, UK

ARTICLE INFO

Article history:

Received 18 September 2016

Received in revised form 12 September 2017

Accepted 21 October 2017

Available online 31 October 2017

Keywords:

Oblique “Scotty dog”

Antero-posterior (AP)

Facet joint

Back pain

Facet injection

ABSTRACT

Background: Facet joint pain contributes significantly to lower back pain. Image intensifier x-ray guidance is used to locate the facet joints. This can either be in the oblique “Scotty dog” or antero-posterior views. The aim is to investigate whether improved visualisation of facet joints using the oblique method would increase the accuracy of the injection and hence lead to enhanced pain relief effect when compared to AP views in Lumbar facet joints.

Methods: Single centre, single blinded. A total of 42 consecutive patients were recruited between December 2014 and March 2015 at Colchester General Hospital. Patients randomly allocated into facet joint injections using the oblique or AP projection. Pre-operatively the patients were asked to rate their back pain using a numerical 11 point pain rating scale in the questionnaire. Post-operatively patients were seen at 6 weeks and once again were asked to fill out the afore mentioned questionnaire. The results were collated and statistical analysis performed using Microsoft Excel.

Results: 29 patients returned their post-op questionnaire at approximately 6 weeks post-op. 12 patients had oblique view and 17 patients had AP view. There was a statistically significant difference in the pain scores comparing pre and post op scores for both the Oblique and AP groups. However, there was no significant difference when comparing the post-op pain scores or the absolute changes in pain scores between the two groups.

Discussion: Spinal facet joint injections provide significant relief at the 6 week post-op follow up with no difference between the oblique and AP techniques.

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1. Introduction

Mechanical lower back pain has long been an area within medicine that represents a treatment challenge. It often has complex, multi-factorial pathology. The role of the facet joint in back pain is well recognised and has been discussed extensively within the literature. In some instances, it can be a significant cause in 15–40% of cases.^{1–6} The pain from facet joints can be either a direct result of the arthritic process or due to secondary impingement on surrounding structures. Lumbar facet joints are

innervated by medial branches of the primary dorsal rami. Each primary dorsal ramus provides supply to the facet joint at the corresponding level and the level below.⁷ Facet joint injections therefore can offer a simple, safe and potentially effective solution in the symptomatic management of this condition.

There are two approaches described for injections to treat facet joint pain. The first and more commonly used one is the medial branch block. The other is direct facet joint block.⁸ For medial branch blocks, the target point will be the junction of the superior facet and the transverse process. On oblique view this lies high on the eye of the Scotty dog. With regards to visualisation of the facet joint itself, the target point will be the midpoint of the silhouette of the joint cavity. If this is not visualised, it could be either due to the destructive arthritic process or malposition of the x-ray beam.⁹ In order to obtain the oblique “Scotty dog” view, the c-arm is angulated by 25–35° towards the required side. The eye of the Scotty dog represents the pedicle.⁸

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Increasing the accuracy, hence potentially the efficacy of facet joint injections has previously been described in the context of using ultrasound and CT guidance. However, within the financial and logistical constraints of many units these modalities are often not available or are associated with increased costs. The use of intra-operative x-ray Image intensifier is simple, readily available, and common practice within the Orthopaedic departments.

In this single centre study we therefore examine two techniques available for visualising the facet joint using the image intensifier and compare the efficacy of each. Our null hypothesis is that oblique “Scotty dog” x-ray views do not increase accuracy of delivery into the facet joint, hence would not increase efficacy of the injection compared to AP x-ray views.

2. Methods

A prospective single centre study was undertaken. 42 consecutive patients were enrolled into the study between December 2014 and March 2015 at our hospital, Orthopaedics department, Spinal Surgery. There are two consultant spinal surgeons, one utilises the oblique “Scotty dog” view technique whilst the other uses AP view technique to visualise facet joints and perform facet joint injections. The patients were randomly allocated through way of referral to either one of the spinal surgeons by the spinal multi-disciplinary team. The study is single blinded as the patients did not know which Surgeon used which technique. All of these patients described symptoms of mechanical lower back pain, with a sub-set of these patients also described leg pain due to nerve root compression. No exclusion criteria were applied to the patient selection. The decision to list the patient for injection is taken by the consultant in clinic based on the clinical and radiological findings. All the patients were listed for a therapeutic pain relieving treatment rather than for diagnostic purposes.

A pain questionnaire was designed by the lead author. This was based on using the validated 11 point numeric rated scale from 0 to 10 with a score of 0 representing no pain and 10 the worst pain ever. This was also supplemented with a Visual analogue scale and 4 point categorical verbal rating scale to help the patients provide as accurate a numeric pain score as possible (See Fig. 1). Pre-operatively the patients were asked to rate their back pain using the questionnaire on the morning of the surgery. They were asked to rate it based on an average over the preceding 6 weeks. This was to ensure that an adequate representation of their pain was recorded. There were three surgeons involved, one consultant grade and two specialist registrars in performing the injections. A

standardised protocol for obtaining the views and performing the injections were agreed.

The facet joints were visualised using image intensifier with either an oblique “Scotty dog” view or standard antero-posterior

Fig. 2. Marking of the facet joints on AP x-ray view.

Fig. 3. AP x-ray visualisation of the facet joints.

Patient ID: _____

Op: Caudal/Facet/Nerve root

Technique: (AP or Oblique)

Surgeon: _____

Pain score scale (Pre-Op)
Please circle number

>>Back pain<<

0	1	2	3	4	5	6	7	8	9	10
None	Mild		Moderate			Severe				
<div style="display: flex; justify-content: space-between;"> <div> NRS VRS VAS </div> <div> No pain = 0 </div> <div> Worst pain imaginable </div> </div>										

Fig. 1. Pre-operative pain score questionnaire.

Fig. 4. Position of C-arm to obtain oblique “Scotty dog” view of facet joints on ipsilateral side.

(AP) view. In both arms the patient is positioned prone on a radiolucent Table Sedation was administered by the anaesthetist in all cases. Marking of the facets is done with an indelible permanent marker using radio opaque marking sticks and the image intensifier in the AP view setting (see Fig. 2). The horizontal and vertical lines are drawn and the intersections represent the position of the facets joints. The L3/4, L4/5 and L5/S1 facet joints are marked bilaterally. In addition, all patients received a caudal epidural injection with the same standardised technique for both groups. Some patients, in addition to facet and caudal injections, received nerve root blocks specifically for the presence of leg symptoms, in addition to the back symptoms.

With the AP view group, the x-ray source of the c-arm is placed ventrally and the image intensifier component placed dorsally, allowing the intended anterior to posterior projection. The facets joints are marked. The patient is prepped and draped. 6 spinal needles are inserted over the intersection of the lines. The image intensifier is used again to confirm correct placement of needles

Fig. 5. Oblique “Scotty dog” x-ray visualisation of the facet joints.

and any adjustments required (see Fig. 3). A 30 ml syringe is prepared containing steroid and local anaesthetic as per protocol. 2.5 mls is injected into each joint.

With the oblique “Scotty dog” view, the x-ray source of the c-arm is also placed ventrally and the image intensifier component placed dorsally. Marking of the facet joints using the horizontal and vertical line is done as per the AP view group. The patient is also prepped and draped. 3 spinal needles inserted either on the left or right side, the image intensifier is then brought in and angled at approximately 25–35° (see Fig. 4), depending on patient positioning and anatomy, towards the side being injected to obtain the required view of the joint. The position of the needles is confirmed and adjusted as required under x-ray guidance (see

Fig. 6. Change in pain post-op.

Fig. 5). 2.5 mls is injected into each facet joint. The needles are removed the process repeated on the other side.

The visualisation of the facet joint was based solely on image intensifier. We did not feel the use of contrast material to confirm intra-articular placement was necessary. It is a small joint and it was felt that image confirmation is sufficient.

The decision to inject the lower most three facet joints bilaterally was based on the fact that diagnosis can sometimes be difficult to ascertain which of these joints is responsible for generating pain in a degenerate lumbar spine due to the poor localisation of pain from the facet joints due to the pattern of innervation. It can also be difficult to detect early degenerative changes. It was therefore felt that injection the most commonly affected joints would yield maximal overall therapeutic effect.

Post-operatively the patients were advised to lie down on the back for 30 min and then were discharged home once recovered from the effect of sedation. The patients were then seen in the outpatient department at 6 weeks following the procedure and once again filled out the afore mentioned pain score questionnaire. They were again asked to score their pain based on the average for the 6 week post-operative period. The results were collated and statistical analysis undertaken using Microsoft Excel.

3. Results

42 patients were recruited and followed up at approximately 6 weeks post-op. We were only able to record the 6 week questionnaire results for 29 of them. Those who did not bring in or fill the post-op questionnaire at the 6 week follow up appointment were contacted by phone to record the scores. 13 patients did not bring their post op questionnaire to the 6 week appointment and were not contactable by phone later.

Of the 29 patients who did respond, 17 patients had AP view and 12 patients had oblique view. In the AP group, 52% were male patients and 48% female. The mean age was 53 years. 11 patients reported improvements, 2 reported worsening, and 4 had no change in the pain level following the injection. In the oblique group, 25% of the patients were male and 75% female. The mean age was 52 years. Half the patients reported improvement following the injection (see Fig. 6).

The paired student *t*-test was used (Microsoft Excel) to perform the statistical analysis for each group comparing pre and post op scores. There was a statistically significant difference in the pain scores comparing pre and post op for both the AP (P 0.001) and oblique groups (P 0.015). However, there was no statistical difference when comparing the AP versus oblique group in both post-op pain scores and absolute changes in pain scores. The Mann-Whitney test was used for this analysis.

4. Discussion

The limitations of the study include the small sample size and high non-respondent rate. In the future, the use of a daily pain diary score for the 6 week post-op period might provide a more accurate picture by eliminating potential recall bias.

Lumbar facet joint injections provide simple and significant relief at the 6 week post-op follow up with no difference between the oblique and AP techniques in terms of improvement in pain scores. We therefore accept our null hypothesis. We advocate using the technique the operator is most familiar with. We have observed that the AP view technique is faster to perform and requires less manoeuvring and possibly less exposure to radiation compared to the oblique technique. We believe that there has been no research published comparing the two techniques directly and that our study will help the operator in their choice with possibly a reduction in cost, theatre time and x-ray exposure. At this stage we recommend a larger, perhaps multicentre study to further explore these results.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

None.

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