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A PROSPECTIVE EVALUATION

FLUSHING AS A SIDE EFFECT FOLLOWING LUMBAR TRANSFORAMINAL EPIDURAL STEROID INJECTION

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Background: Epidural steroid injections (ESI) are commonly used in managing radicular pain. The risk of complications with epidural steroids is small, with the majority of complications being non-specific. Flushing is a known side effect of corticosteroid administration. The occurrence of flushing after epidural steroids has not been studied prospectively.

Objective: To compare flushing as a side effect of Betamethasone acetate/ Betamethasone sodium phosphate (Celestone®) vs. Methylprednisolone (DepoMedrol®) in fluoroscopically guided epidural steroid injections.

Study Design: Non-concurrent Prospective Database Study

Methods: Two-hundred forty patients, who underwent epidural steroid injections in the University of Rochester Spine Center in the year 2001 were included.

Eighty-one patients underwent epidural steroid injections with Celestone. One hundred fifty nine patients received treatment with Depo-Medrol.

Patients were contacted two days after the procedure by a staff member and specifically asked about the presence of flushing following steroid injection. The answers were recorded as “yes” or “no”.

Results: Out of 81 patients who underwent ESI with Betamethasone acetate/ Betamethasone sodium phosphate, 13 reported a flushing reaction (16%). Out of 159 patients, who underwent ESI with Methylprednisolone, 14 reported a flushing reaction (9%). This side effect difference was not statistically significant ($p < 0.143$ and odds ratio of 0.505). The overall incidence of flushing was approximately 11%.

Conclusion: Flushing reaction appears to be more widespread than previously assumed, with an overall incidence of 11%. There was no significant difference in self-reported flushing reactions following lumbar epidural steroid injections using either betamethasone or methylprednisolone.

Keywords: Epidural steroid injection, flushing, Celestone, betamethasone, Depo-Medrol, methylprednisolone, side effects

Lumbar epidural steroid injections (ESI) have become a commonly used treatment for radicular pain. The use of epidural injections with local anesthetic medication dates to the early 20th century. In 1909, Caussade and Queste (1) presented several cases in which “sciatica” had been treated by spinal injection with “stovaine” (amylocaine hydrochloride). In 1953, Lievre et al (2) reported epidural corticosteroid administration. In 1957, Capprio (3) reported a beneficial effect in patients with sciatica by administering local anesthetic into the sacral epidural space.

Several routes of epidural steroid administration are currently utilized including caudal, interlaminar and transforaminal approaches. Corticosteroids, in combination with local anesthetic, are used in treating painful spinal disorders by epidural administration based on their potent anti-inflammatory effect. However, risks and complications of lumbar ESI have been reported (5-12). The vast majority of complications following lumbar ESI are minor and nonspecific (12). Although rare, severe complications including septicemia have been reported (12). Minor complications can include dural puncture and post-dural puncture headache, unintentional subdural or subarachnoid injection, weight gain in conjunction with salt and water retention, possibly exacerbating congestive heart failure or hypertension, local discomfort, mild exacerbation of radicular pain during injection, vasovagal reactions to the needle, transitory headaches during injection, reactions to the local anesthetics and flushing.

Flushing is a known side effect of corticosteroid administration (5-8, 12, 15). The occurrence of flushing has been studied following steroid injections used to manage adhesive capsulitis of the shoulder (14), and following cervical interlaminar (7, 16), lumbar transforaminal (5), and caudal ESI (6). These studies were retrospective reviews of large numbers of individuals who received injections. There has been no prospective study designed to assess the incidence of flushing or the incidence of flushing between different steroid preparations. This study was undertaken to evaluate flushing following transforaminal epidural steroid injections either with Celestone® or Depo-Medrol®.

METHODS

Participants

The study was approved by the University of Rochester Human Subjects Review Board. The 240 subjects included in the study were patients referred to a university based multidisciplinary Spine Center. The subjects were referred for evaluation and management of radicular pain during the interval between Jan 1, 2001 and December 31, 2001.

Procedure

The subjects of the study were offered a fluoroscopically guided lumbar

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transforaminal ESI for treatment of lumbar radicular or discogenic pain. The risk and benefits of epidural steroid injections were discussed with each subject prior to the procedure. Each patient provided oral and written informed consent prior to proceeding with the injection. The 81 epidural steroid injections prior to May 5, 2001 were performed with 6 mg of Betamethasone acetate/Betamethasone sodium phosphate (Celestone). After May 5, 2001 the next 159 patients received treatment with 80 mg of methylprednisolone (Depo-Medrol®).

Data Collection

A staff member from the Spine Center contacted each subject two days following the injection and specifically asked about the presence or absence of flushing following the injection, defined as redness or warmth, without rash. The answers were recorded as "yes" or "no".

Statistical Methods

Differences in proportions were tested using chi-squared test. Results were considered statistically significant if the P value was less than 0.05.

RESULTS

A total of 240 patients received fluoroscopically guided lumbar transforaminal epidural steroid injections. There were no major complications associated with any of the injections. Of these 240 patients, 81 were treated with Betamethasone acetate/Betamethasone sodium phosphate while 159 were treated with methylprednisolone. The incidence of flushing reaction is depicted in Table 1.

The overall incidence of flushing was 27 out of 240 cases or 11%. Despite a trend toward a higher rate of flushing within the Betamethasone group the difference in incidence was not statistically significant. Using a Chi-Square analysis that compared patients treated with Celestone to Depo-Medrol the *p value* < .143 and an Odds Ratio was calculated at 0.505. The flushing reaction was self-limited among those who experienced the side effect. Patients who requested treatment for the reaction were recommended to use an oral antihistamine for 2-3 days to minimize the symptoms.

DISCUSSION

The etiology of flushing following the use of steroid medications is not entirely clear. Current studies suggest an immunoglobulin (IgE) -mediated mechanism (15). A portion of the reaction is mediated by histamine. The reaction tends to be self-limited (17) However, the flushing reaction may mimic signs and symptoms of an anaphylactic reaction that creates concern for patients and physicians. Antihistamine medications such as diphenhydramine are helpful in improving symptoms associated with flushing.

The incidence of flushing following lumbar epidural steroid injections in this study is higher than the incidences reported in prior studies. Jacobs et al (14) reported only two episodes of flushing following 50 intraarticular shoulder injections that he performed. DeSio et al (13) noted flushing in only 12 of 1399 patients (.86%) following both cervical and lumbar injections. Botwin et al (5, 6) reported a similarly low rate of flushing following both lumbar transforaminal (1.2%) and caudal epidural steroid injections (2.3%). Cicala (7) performed 204 cervical epidural injections with corticosteroids in 142 patients with methylprednisolone acetate. Complications that developed as a result of the procedure included mild facial flushing with subjective (but not objective) fever lasting about 12 hr occurring in 9.3% of patients. Manchikanti et al (18) in performing 256 transforaminal epidural steroid injections with Celestone in 100 patients, reported lack of flushing.

The reason for a higher incidence of flushing in our study is not clear. Possible reasons for the higher incidence include study design (prospective design, specifically inquiring from patients about a flushing reaction), the route and/or dosage of steroid used, or the mode of the steroid administration through a transforaminal approach. The incidence of flushing was determined by telephone report and not by actual examination of the patient following the injection. This is a potential weakness with the design of the study as there may be a discrepancy between a patient's subjective report of the flushing and a true flushing reaction. Another potential weakness in this study is a relatively larger number of patients who were treated with an injection using Depo-Medrol. This weakness was due to the shortage of Betamethasone acetate/Betamethasone sodium phosphate (Celestone®) which was difficult to obtain following commencement of the study.

CONCLUSION

In summary, the incidence of flushing following fluoroscopically guided lumbar transforaminal epidural steroid injections may be higher than previously reported. The overall incidence of flushing is approximately 11% and does not appear to be significantly different between commonly used steroid preparations. Flushing tends to be a minor self-limited side effect following epidural steroid injections, which can be minimized with the use of antihistamine medications.

Table 1. *Flushing reaction vs. steroid preparation*

	Depo-Medrol	**Celestone**	**Total**
Flushing	14 (9%)	13 (16%)	27 (11%)
No Flushing	145 (91%)	68 (84%)	213 (89%)
Total	159 (100%)	81 (100%)	240 (100%)

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