DOES IMMEDIATE MOBILIZATION INCREASE POST LUMBAR PUNCTURE-HEADACHE?
Li-Ling Lim, MD; Alexandra Villa-Forte, MD; Nabin Shrestha, MD; Stephan Schule, MD; Ikenna Okereke, MD; Mark Stillman, MD
Department of Neurology
Cleveland Clinic Foundation, Cleveland, Ohio

ABSTRACT

OBJECTIVE:
To determine if immediate mobilization after lumbar puncture (LP) increases the incidence of post lumbar puncture headache (PLPHA).

BACKGROUND:
PLPHA occurs commonly: the average frequency of PLPHA in patients after diagnostic LP has been reported to be about 30%. There are no convincing studies to show that bed rest after LP reduces PLPHA. The benefit of bed rest to prevent PLPHA remains controversial. If immediate mobilization does not increase the occurrence of PLPHA compared to bed rest, patients can be safely discharged as soon as the procedure is complete. This will improve utilization of resources.

STUDY DESIGN:
This is a prospective randomized study. Patients were recruited from the LP clinic of a large tertiary care facility. Consecutive patients seen here over a 5 month period (February through June 2001) were included in the study. The patients were randomized to bed rest or immediate mobilization post LP. The main outcome variable was the presence (or absence) of PLPHA.

STATISTICAL ANALYSIS:
Baseline demographic characteristics were compared in the two groups using the t-test for independent samples for quantitative variables and the chi-square test for categorical variables. The difference in the proportion of patients with post-LP headache in the two groups was compared using the chi-square test.

RESULTS & DISCUSSION:
We found that immediate mobilization after LP does not increase the incidence of PLPHA. There was no difference in the duration of PLPHA when it did occur. These findings suggest that the routine practice of bed rest after LP may be unnecessary.
OBJECTIVE:
To determine if immediate mobilization after lumbar puncture (LP) increases the incidence of post lumbar puncture headache (PLPHA).

BACKGROUND:
PLPHA occurs commonly: the average frequency of PLPHA in patients after diagnostic LP has been reported to be about 30%, with reported ranges from 6% ~ 40% in different studies.

Potential risk factors identified in earlier reports are younger age, female gender, headache before or at the time of LP, and larger needle size. PLPHA occurs more often in women, especially in the child-bearing years and with a small BMI. Those with a headache before or during the LP or a history of PLPHA may have more frequent and severe headaches.

There are no convincing studies to show that bed rest after LP reduces PLPHA. Conversely there have been reports of increased PLPHA in recumbent patients compared to those immediately mobilized. One study showed that while bed rest does not alter the incidence of PLPHA, it does reduce the severity of PLPHA.

Bier postulated that PLPHA was due to cerebrospinal fluid (CSF) leakage at the puncture site. The lowered CSF pressure may cause shifting of the brain with pressure on pain-sensitive dural sinuses. This effect is exacerbated by erect posture and alleviated by recumbency.

The benefit of bed rest to prevent PLPHA remains controversial. A recent meta-analysis of 16 randomized controlled trials involving 1083 patients showed that longer bed rest was no better than immediate mobilization or short bed rest in reducing PLPHA.

A period of bed rest is often recommended after an LP. In the outpatient setting keeping the patient post procedure reduces bed availability and the total number of LPs performed. If immediate mobilization does not increase the occurrence of PLPHA compared to bed rest, patients can be safely discharged as soon as the procedure is complete. This will improve utilization of resources.
STUDY DESIGN:
This is a prospective randomized study.

Patients were recruited from the LP clinic of a large tertiary care facility. This clinic performs 3-5 LPs once a week. All patients seen here over a 5 month period (February through June 2001) were included in the study. The patients were randomized to bed rest or immediate mobilization post LP. The main outcome variable was the presence of PLPHA. PLPHA was defined according to the International Headache Society diagnostic criteria for PLPHA: any headache after LP with the following characteristics: headache appearing or significantly worsening upon assuming an upright position and resolving or improving significantly upon lying down. The headache is bilateral, develops within 7 days after an LP and resolves within 14 days after the LP.

The patients seen in this clinic are outpatient referrals from other outpatient clinics sent for diagnostic LPs. Neurology residents are randomly assigned to perform the LPs. A 20G cutting needle is used in all patients with insertion of the LP needle bevel parallel to the dural fibers, reinsertion of the stylet before withdrawing the needle & in the lateral supine position. Between 20 ~ 25 cc of CSF are collected for each patient.

Consecutive patients were recruited over 5 months and randomly assigned to 2 groups:
Group A – Patients lay down for half an hour or longer before discharge (with instructions to rest in bed for up to 6 hours after getting home).
Group B - Patients were immediately mobilized after LP then sent home (and given no other instructions).

Information collected included age, gender, body mass index (BMI), history of headache, number of needle stick attempts, duration of bed rest after the LP and duration of headache if any.

In group A patients followed the routine post-LP protocol at the LP clinic: They were discharged after a ≥ 30 minute period of bed rest. They were given instructions to drink plenty of fluids (8~10 eight-ounce glasses per day) for several days, to recline in the car going home & then for 6 ~ 8 hours after arriving home. In group B, patients were discharged immediately after the LP and given no instructions regarding posture or activity.
All patients were subsequently interviewed by the principal investigator.

**STATISTICAL ANALYSIS:**
In order to have a power of 95% to detect an increase in the proportion of patients with post-LP headache in the immediate mobilization group from 30% to 45%, with a 2-tailed $\alpha$-error rate of 0.20, we estimated that we would need 65 patients. We postulated that a 50% increase in the incidence of PLPHA in the immediate mobilization group would be a clinically important difference. Baseline demographic characteristics were compared in the two groups using the *t*-test for independent samples (normal distribution assumed) for quantitative variables and the *chi-square* test for categorical variables. The difference in the proportion of patients with PLPHA in the two groups was compared using the *chi-square* test.

**RESULTS:**
98 consecutive patients were recruited in the study period. There were 33 patients in group A & 32 in group B. Another 33 patients could not be contacted for follow up despite repeated attempts. The overall incidence of PLPHA in our study population was 32.3% (21/65 patients).

We found no differences in the distribution of age, gender, BMI, number of attempts at LP and headache history between the 2 groups that could potentially bias outcomes (Table 1). There were 23 women and 10 men in group A (bed rest group) with a mean age of 47.7 y (range 31-76 y) and a mean BMI of 31.2 (range 17.5-55.1). In this group there was an average of 2 needle sticks for each successful LP; 11(33%) reported a prior history of headaches. In group B (immediate mobilization group) there were 21 women and 11 men with a mean age of 55.9 y (range 20-86 y) and a mean BMI of 28.6 (range 20.3-47.2). In this group there was an average of 2.2 needle sticks for each successful LP; 7 (21.9%) reported a prior history of headaches.

In group A 14/33 patients (42.4%) experienced PLPHA compared to 7/32 patients (21.9%) in group B (Figure 1). This difference was statistically significant at the $\alpha$ error level of 0.2 ($p= 0.08$). Unexpectedly, there was more PLPHA with bed rest rather than with immediate mobilization (Table 2). The duration of PLPHA was not significantly different comparing both groups, even when analyzing only the patients with headache (Tables 3 and 4).
CONCLUSION:
We found that immediate mobilization after diagnostic LP did not increase the incidence of PLPHA. There was a trend toward more PLPHA in the bed rest group. Our PLPHA incidence of 32.3% compares with the 30% average reported in earlier studies. There was no difference in the duration of PLPHA when it did occur. No risk factors for PLPHA were clearly identified.

These findings suggest that the routine practice of bed rest after LP may be unnecessary. Larger, prospective studies would help define the role of longer periods of bed rest and different resting positions (eg supine versus prone) in making recommendations for routine post LP care, with the goal of reducing the morbidity of PLPHA and more efficient utilization of resources.

Table 1. Baseline characteristics of the study patients

<table>
<thead>
<tr>
<th></th>
<th>Group A (bedrest) n = 33</th>
<th>Group B (immediate mobilization) n = 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age^1</td>
<td>47.7 ± 13.1</td>
<td>55.9 ± 14.8</td>
</tr>
<tr>
<td>Sex^2</td>
<td>23 female 10 male</td>
<td>18 female 13 male</td>
</tr>
<tr>
<td>History of post LP headache^2</td>
<td>22: no history of LP HA 11: history of LP HA</td>
<td>25: no history of LP HA 7: history of LP HA</td>
</tr>
<tr>
<td>Weight (BMI)^1</td>
<td>31.2 ± 8.5</td>
<td>28.6 ± 5.9</td>
</tr>
<tr>
<td>Number of attempts^1</td>
<td>2.0 ± 1.4</td>
<td>2.2 ± 1.4</td>
</tr>
</tbody>
</table>

^1 t-test: no significant difference between groups
^2 chi-square: no significant difference between groups

Figure 1. Effect of mobilization on the occurrence of headache
Table 2. Does immediate mobilization increase post-lumbar puncture headache?

<table>
<thead>
<tr>
<th></th>
<th>Headache</th>
<th>No headache</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed rest</td>
<td>14</td>
<td>19</td>
<td>33</td>
</tr>
<tr>
<td>Immediate mobilization</td>
<td>7</td>
<td>25</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>44</td>
<td>65</td>
</tr>
</tbody>
</table>

Pearson’s chi-square: 3.137; d.f. = 1; Significance (2-sided): 0.077 (p<0.2; significant at the 0.2 level of significance)

Table 3. Duration of Headache

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of patients</th>
<th>Mean duration of headache</th>
<th>Standard deviation</th>
<th>S.E.M.</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed rest</td>
<td>33</td>
<td>1.73</td>
<td>2.49</td>
<td>0.43</td>
<td>0.87 - 3.35</td>
</tr>
<tr>
<td>Immediate mobilization</td>
<td>32</td>
<td>0.97</td>
<td>2.42</td>
<td>0.43</td>
<td>0.11 - 3.28</td>
</tr>
</tbody>
</table>

$t$-test (equal variances assumed): t = -1.246; d.f. = 63
Significance (2-tailed): 0.218 (p > 0.2)
80% confidence intervals also overlap indicating no difference between the groups even when tested at the 0.2 level of significance.

Table 4. Duration of Headache when present

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of patients</th>
<th>Mean duration of headache</th>
<th>Standard deviation</th>
<th>S.E.M.</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed rest</td>
<td>14</td>
<td>4.07</td>
<td>2.23</td>
<td>0.6</td>
<td>2.87 - 5.27</td>
</tr>
<tr>
<td>Immediate immobilization</td>
<td>7</td>
<td>4.43</td>
<td>3.51</td>
<td>1.32</td>
<td>1.79 - 7.07</td>
</tr>
</tbody>
</table>

$t$-test (equal variances not assumed / Levene’s test): t = 0.246; d.f. = 8.5
Significance (2-tailed): 0.812 (p > 0.2)
80% confidence intervals also overlap indicating no difference between the groups even when tested at the 0.2 level of significance.