THE LATERAL APPROACH FOR SPINAL ANESTHESIA * †

A MODIFICATION OF THE TAYLOR SUBARACHNOID TAP FOR SURGERY IN THE PRONE POSITION

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THE lateral approach to the subarachnoid space was first described in 1872 by Quincke (1). In 1938, Maxson (2) referred to this work and stated that at that time he was performing all subarachnoid injections by this technique. The needle is inserted one-half inch from the midline opposite the chosen interspace. In this way, the tough interspinous ligament and the overhanging spinous process are avoided. In 1940, the urologist John Taylor described a technique for spinal anesthesia by which the spinal canal is entered via the lumbosacral space. With the patient in the prone position, a skin wheal is raised at a point 1 cm. below and medial to the lowermost prominence of the posterior-superior spine of the ilium. The needle is then directed cephalad and medial at an angle of up to 55 degrees until the needle enters the spinal canal in the midline at the lumbosacral interspace (3). As Taylor stated at that time, and as Schuetz confirmed, this technique has certain definite advantages (4). Comfort to the patient is at its maximum; ease of puncture is at its maximum, since the interspace is entered at its widest point and the frequently calcified interspinous ligament is avoided; vasomotor changes are at a minimum; and, as this report will suggest, the incidence of severe postspinal cephalagia is decreased.

The purpose of this article is twofold; to demonstrate that there is a decrease in the incidence of headache and to stress that there are advantages to both patient and surgeon with the use of this technique. The ideal set of circumstances for the use of the prone-position spinal is the prone (or Buie) position for pilonidal or rectal surgery.

TECHNIQUE

A modification of the Taylor approach has been adopted (3). The patient is carefully placed on the table in the prone position so that when the table is flexed for optimal surgical exposure there will be no need to move the patient. The table is flexed ten degrees and

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FIG. 1. Patient in prone position with needle in place (anteroposterior lateral view).

we are now ready to perform the tap. A skin wheal is raised 1 cm. medial and cephalad to the most prominent portion of the posterior-superior spine of the ilium. A 22 or 20 gauge needle is inserted through this wheal in a direction that is cephalad and medial 45 degrees in both planes until it is felt that the needle is in the midline.

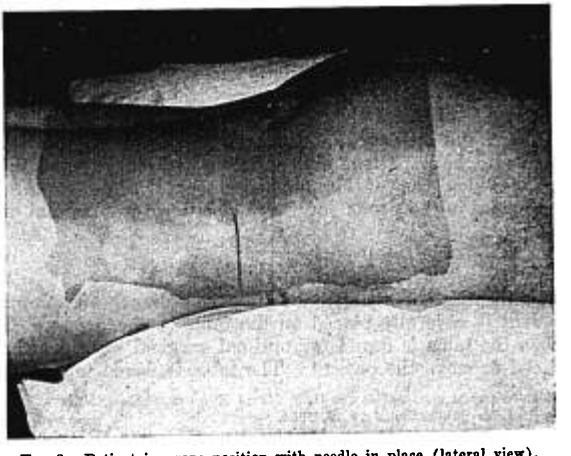

FIG. 2. Patient in prone position with needle in place (lateral view).

Identification of the lumbar spinous processes will help to establish the correct position (figs. 1 and 2). The needle will usually be found to have been advanced 3 to 3½ inches before spinal fluid is found. The characteristic "give" as the needle passes through the ligamentum flavum is present, but the usually described "snap" is absent. Using the point medial and cephalad to the posterior-superior spine will result in the needle entering the interspace between L4 and L5. This may be seen in figures 3 and 4.

Since the dorsal roots are uppermost, it is necessary to use an anesthetic agent that will rise (hypobaric) or remain stationary

FIG. 3. Anteroposterior x-ray picture of lumbosacral region with spinal needle in place at L4–L5 interspace.

(isobaric) so as to bathe these dorsal sensory roots. We have elected to use an isobaric solution of 1 per cent tetracaine hydrochloride (pontocaine®) with the dosage varying from 6 to 10 mg. In the 200 cases to be reported, it was not necessary at any time to use a vasopressor either prophylactically or therapeutically, for there was not a single incident of hypotension and the level of sensory anesthesia was never higher than the iliac crests. The explanation is as follows: with the patient in the prone position, the most dependent curve of the vertebral column is the lumbar curve; the most dependent portion of this lumbar curve is the fourth lumbar vertebra; the isobaric solution

is deposited at this point; from there it is able to diffuse caudad to bathe the sacral roots but can climb no higher than the first lumbar vertebra (fig. 2). By clinical trial, we have demonstrated that the level of anesthesia cannot rise higher than the first lumbar vertebra even with a weighted solution and with the patient in a 75 degree Trendelenburg position.

Of practical consideration is the point that, as soon as the anesthesiologist has injected the drug, he can step back and permit the surgeon immediately to begin his surgical preparations of breaking the table, spreading the buttocks, and preparing the operative site. (fig. 5). There is no need for delay between the administration of the anesthetic and the onset of surgery as is necessary following the

FIG. 4. Lateral x-ray picture of lumbosacral region with spinal needle in place at L4–L5 interspace (see arrow).

use of the lateral and the sitting positions, when one must wait for the anesthetic to "set" before changing the position of the patient.

The only disadvantage that we have found in the use of the modified Taylor approach has been technical. To the uninitiated, the first few attempts are usually unsuccessful. However, as more and more attempts are made, fewer and fewer failures occur, until one wonders why initial difficulties were ever encountered.

We now arrive at our second purpose for the publication of this article and the subject that we have stressed in our clinical investigation—the incidence of postspinal headache. The evidence in the literature today is overwhelmingly in favor of the leakage theory as the etiological factor in the production of postspinal headache. Assuming

that this is true, then it follows that the needle insertion which produces the least tear or which passes through the dural fibers without tearing will produce the fewest number of postspinal headaches. Theoretically there are 2 reasons why the modified Taylor technique will lower the incidence of headache. First, the dura is conceivably in a re-relaxed condition. With the patient in the prone position, the lumbar curve is concave; there is no stretching of the dura. The needle passes through with a doughy sensation rather than with the characteristic snap as when done in the lateral or the sitting position. Secondly, as we have already stated, there is no motion of the patient after performance of the tap. This reduces the possibility of increasing the size of the original hole in the dura by pulling, straining, and other motions of

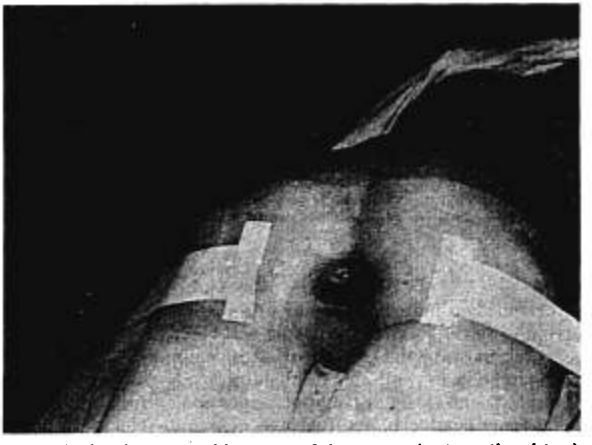

FIG. 5. Patient in prone position, prepared for surgery (postoperative picture).

the patient, both subjectively and objectively, either while the needle is in place or in the efforts to change to the correct position for surgery. This, we feel, is the rationale behind our decreased incidence of postspinal headache following the prone-position method of spinal anesthesia.

METHOD

The modified Taylor tap was performed on 200 patients, all of whom were either active duty personnel of the Armed Forces or their dependents. The procedures were performed by anesthesiologists, either staff men or residents. The operations performed were pilonidal cystectomies, hemorrhoidectomies, and miscellaneous procedures upon

the anal region. The ages varied from 17 to 69, with an average of 28.3 years; 6.7 per cent were female. Only those cases have been included where one method of spinal anesthesia was performed (table 1). Any combined attempts were disregarded. All patients were carefully followed postoperatively for at least 7 days.

A control group of patients was obtained by performing spinal taps on 200 patients in either the lateral decubitus or the sitting position; 149 were done in the lateral position and 51 in the sitting position. Again, all operations were pilonidal or anal procedures. The age range was from 16 to 64 years, with an average of 26.4 years; 8.8 per cent were female (table 1).

TABLE 1

STUDY GROUP

Position	No. of Patients	Age in Years		Sex		Operative Procedures		
		Range	Average	% M	% F	Pilonidal	Hemorrhoid	Others
1. Prone	200	17–69	28.3	93.3	6.7	102	76	22
2. Controls								
a. Lateral	149	16–64	25.5	90.3	9.7	103	32	14
b. Sitting	51	19–55	28.4	92.0	8.0	16	30	5
c. Total	200	16–64	26.4	91.2	8.8	119	62	19

RESULTS

Before one can judge the efficacy of a procedure or draw conclusions therefrom, a basic standard must be established. In this instance, it is necessary to state the criteria used in making a diagnosis of post-spinal cephalagia as well as establishing levels for severity along the time honored, one-through-three classification. In all of our patients suffering from headache, one fact was constant—elevation of the head increased the severity of the headache. Three factors have been considered in our classification of degree of severity—duration of headache, degree and duration of incapacitation, and presence or absence of gastro-intestinal symptoms. On this basis, a mild or Class I headache lasts less than 2 days, the patient is ambulatory, and there are no gastro-intestinal symptoms. A moderate or Class II headache lasts 2 to 5 days, incapacitates the patient for 1 to 2 days, and produces some nausea and slight vomiting. A Class III or severe headache lasts more than 5 days, is severely incapacitating for 2 to 5 days, and is accompanied by bouts of nausea and emesis. The duration of the headache, *per se*, was considered to be of less importance than the actual incapacitation. Therefore, although several patients complained of headache for longer than 5 days, since they were ambulatory the headache was classified as Class II (table 2).

TABLE 2

CLASSIFICATION OF POSTSPINAL HEADACHES DESCRIPTION

Classification	Type	Duration	Incapacitation	G. I. Symptoms
I	Mild	2 days	None: ambulatory	None
II	Moderate	2-5 days	1-2 days	Nausea, slight emesis
III	Severe	5 days	2-5 plus days	Severe emesis

Using the above criteria, we found a total of 12 headaches among the modified Taylor taps for a percentage of 6, and 20 in the control group for a percentage of 10 (table 3). In both the Taylor-tap group and the control group, where headaches were encountered the age factor was constant with a 26 year average. The entire group of 400 patients also averaged 26 years in age. None of the few patients in

TABLE 3

HEADACHE TOTALS

Position	Headaches		Age in Years		Sex		Operative Procedures		
	No.	% Total	Range	Average	% M	% F	Pilonidal	Hemorrhoid	Others
1. Prone	12	6	20-32	25.6	91.7	8.3	4	5	3
2. Controls									
a. Lateral	15	7.5	20-37	24.5	80	20	6	8	1
b. Sitting	5	2.5	22-34	28.2	100	0.0	1	3	1
c. Total	20	10.0	20-37	26.3	85	15	7	11	2

the older age group developed headache. Although probably not statistically significant, more females complained of headache than males. Of the group of 12 headaches, none was severe, 5 were moderate, and 7 were mild (table 4). In the control group with 20 headaches, 5 were severe, 7 were moderate, and 8 were mild. Therefore, in the control series, 25 per cent of headaches were severe whereas there were no severe headaches when the patient was in the prone position.

In an attempt to determine whether trauma at the insertion of the needle could be correlated with an increased headache incidence, we

TABLE 4

SEVERITY OF HEADACHES

Position	No. 1 Mild	No. 2 Moderate	No. 3 Severe	Totals
1. Prone	7	5	0	12
2. Controls				
a. Lateral	5	5	5	15
b. Sitting	3	2	0	5
c. Total	8	7	5	20

analyzed all 400 cases. We believe that there was no possible correlation. Trauma, *per se*, did not seem to influence the headache picture.

The association factor of patients with headache is ruled out for 2 reasons: first, the rigid criteria adopted in making the diagnosis of headache; second, the fact that, in the 200 patients given spinal anesthesia in the prone position, 7 complained of headache not designated as "spinal" in character, while, in the control series of 200, 8 complained of this type headache. These two points have indicated to us that the everyday-occurring headache and the coincidental headache were not incorporated into this study.

The total number of headaches was subjected to statistical analysis using the student's "T" test. This test showed that, on a basis of samples of 200, the result is not statistically significant.‡

However, when one considers that there were no *severe* headaches in the prone position while 5 (of 20) were seen in the controls, one can say that, clinically, the difference is significant. Therefore, although the figures do not show statistical significance, we have been impressed with our findings."

Discussion and Conclusions

The modified Taylor technique for spinal anesthesia whereby the spinal canal is entered through the lateral approach with the patient in the prone position has many advantages, not the least of which may be the lowered incidence and the decreased severity of postspinal cephalalgia. When this is joined with the lack of circulatory changes, the added safety and comfort to the patient, and the saving in anesthetic time, then we feel that we are justified in making the statement that in the Buie position for operation on pilonidal cysts, hemorrhoids, and other anal procedures, this is the anesthetic of choice.

Summary

A brief history of the use of the lateral approach to the spinal canal is presented with emphasis on the report by Taylor (3).

Using a modification of this technique, the patient is placed in the prone position and the spinal canal entered through the interspace of the fourth and fifth lumbar vertebrae, using the posterior-superior spine of the ilium as the major landmark.

For procedures done in the prone (or Buie) position, this method is ideal since the patient is not moved, there are no circulatory disturbances, and the incidence of postspinal cephalalgia is reduced.

This latter point was proved clinically by the comparison of 200 cases done with the patient in the prone position and 200 in either

‡ $t = \frac{x}{\alpha} = 1.48$ by the formula $= \alpha = \sqrt{\frac{P_1Q_1}{N_1} + \frac{P_2Q_2}{N_2}}$,
$p = 0.14$ (if $p > 0.05$, it is not significant).

the lateral or the sitting position. In the former group, the incidence of headache was 6 per cent; in the latter, the incidence was 10 per cent.

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