Research Article / Araştırma Makalesi

Comparison of Thoracolumbar Interfascial Plane-to-Skin Distances at Different Lumbar Levels and Positions Under Ultrasonography

Ultrasonografi Altında Farklı Lomber Seviyeler ve Pozisyonlarda Torakolomber İnterfasyal Plan ile Cilt Mesafelerinin Karşılaştırılması

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Abstract

Background: This study aimed to determine the optimal lumbar level and patient position for performing the thoracolumbar interfascial plane (TLIP) block by evaluating the distance between the thoracolumbar interfascial plane and the skin using ultrasound guidance. Additionally, we explored the influence of body mass index (BMI) on this distance.
Materials and Methods: Eighty patients aged 18 to 65 years undergoing upper lumbar region surgery were evaluated. The thoracolumbar interfascial plane-to-skin distance was measured at L1 and L3 levels in three positions: sitting, lateral, and prone, using a high-frequency ultrasound probe. Measurements were conducted without needle insertion, ensuring clarity and accuracy. Patient demographics, including age and body mass index (BMI), were recorded and analyzed to assess their impact on these measurements.
Results: The thoracolumbar interfascial plane was significantly closer to the skin at the L1 level compared to L3 across all positions ($p<0.01$). Among the positions, the prone position provided the closest plane-to-skin distance and the clearest ultrasound image, allowing better visualization of anatomical landmarks. Conversely, the sitting position produced the poorest image quality and was the least comfortable for patients. Furthermore, a moderate positive correlation was found between BMI and the thoracolumbar plane-to-skin
Conclusions: Our findings suggest that the L1 level and prone position are optimal for TLIP block application, offering clearer imaging and easier block administration. For obese patients, the prone position is particularly advantageous as it reduces the skin-to-plane distance, potentially minimizing procedural difficulty and complication risks. These insights contribute to the optimization of TLIP block techniques, especially in patient populations with higher BMI. Further studies are recommended to confirm these findings and expand clinical applications.

Keywords: Thoracolumbar interfascial plane block (TLIP), Peripheral nerve block, Ultrasonography, Regional anesthesia

Öz

Amaç: Bu çalışmanın amacı, ultrason rehberliğinde torakolomber interfasyal düzlem ile cilt arasındaki mesafeyi değerlendirerek torakolomber interfasyal düzlem (TLIP) bloğunu gerçekleştirmek için optimum lomber seviyeyi ve hasta pozisyonunu belirlemektir. Ek olarak, vücut kitle indeksinin (VKİ) bu mesafe üzerindeki etkisini araştırdık.
Materyal ve Metod: Üst lomber bölge cerrahisi geçiren 18 ila 65 yaş arası 80 hasta değerlendirildi. Torakolomber interfasyal düzlem-cilt mesafesi, yüksek frekanslı bir ultrason probu kullanılarak üç pozisyonda L1 ve L3 seviyelerinde ölçüldü: oturma, lateral ve yüzüstü. Ölçümler iğne girişi olmadan gerçekleştirilerek netlik ve doğruluk sağlandı. Yaş ve vücut kitle indeksi (VKİ) dahil olmak üzere hasta demografileri kaydedildi ve bu ölçümler üzerindeki etkilerini değerlendirmek için analiz edildi.
Bulgular: Torakolomber interfasyal düzlem, tüm pozisyonlarda L3'e kıyasla L1 seviyesinde cilde önemli ölçüde daha yakındı ($p<0,01$). Pozisyonlar arasında, yüzüstü pozisyon en yakın düzlem-cilt mesafesini ve en net ultrason görüntüsünü sağladı ve anatomik dönüm noktalarının daha iyi görüntülenmesini sağladı. Tersine, oturma pozisyonu en kötü görüntü kalitesini üretti ve hastalar için en az konforlu olanıydı. Ayrıca, BMI ile torakolomber düzlem-cilt mesafesi arasında orta düzeyde pozitif bir korelasyon bulundu ve bu, artan BMI'nin incelenen tüm pozisyonlarda mesafeyi artırdığını gösterdi.
Sonuç: Bulgularımız, L1 seviyesinin ve yüzüstü pozisyonun TLIP blok uygulaması için en uygun olduğunu, daha net görüntüleme ve daha kolay blok uygulaması sağladığını göstermektedir. Obez hastalar için yüzüstü pozisyon, cilt-düzlem mesafesini azalttığı ve potansiyel olarak prosedürel zorluk ve komplikasyon risklerini en aza indirdiği için özellikle avantajlıdır. Bu içgörüler, özellikle daha yüksek BMI'li hasta popülasyonlarında TLIP blok tekniklerinin optimizasyonuna katkıda bulunur. Bu bulguları doğrulamak ve klinik uygulamaları genişletmek için daha fazla çalışma önerilmektedir.

Anahtar Kelimeler: Torakolomber interfasiyal düzlem bloğu (TLIP), Periferik sinir bloğu, Ultrasonografi, Rejyonel anestezi

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Introduction

The development and accessibility of ultrasound technology have significantly advanced peripheral nerve block applications in recent years. As ultrasound-guided (USG) techniques become more integrated into clinical practice, interfascial plane blocks, a type of trunk block, have gained popularity for both surgical anesthesia and the management of acute and chronic pain. These blocks are now widely utilized due to their effectiveness, relative simplicity, and the increased proficiency of practitioners trained in USG techniques (6,8,11).

Among the interfascial plane blocks, the Thoracolumbar Interfascial Plane (TLIP) block has emerged as a promising option, particularly in lumbar region surgeries and pain management. First introduced by Hand et al. in 2015, the TLIP block involves the administration of a local anesthetic injection between the multifidus and longissimus muscles at the lumbar level (3rd lumbar vertebra) (9). This technique is designed to target the dorsal rami of the thoracolumbar nerves, which are responsible for innervating the posterior aspect of the thoracolumbar spine. By doing so, TLIP blocks can provide substantial postoperative analgesia, making them valuable in managing pain associated with lumbar spine surgeries, as well as for chronic lower back pain and minimally invasive spinal procedures (4,15,21).

The TLIP block offers notable adaptability, allowing it to be performed in various patient positions, including sitting, lateral, and prone (2,9). Each position uniquely affects patient comfort, ultrasound visibility of anatomical landmarks, and block efficacy. Research indicates that position choice and obesity can influence nerve block success by impacting ultrasound probe stability, image clarity, and accessibility to the target site (16). However, while measurement studies exist for other block types, there is a notable lack of such studies specifically addressing the TLIP block, highlighting a significant gap in the literature (5,6). Our study systematically evaluates the imaging quality, probe stability, and effectiveness of the TLIP block across different positions, with particular attention to the effects of obesity, providing new insights for optimizing block techniques in diverse patient populations.

In addition to the choice of position, the lumbar level at which the TLIP block is applied is another factor that may influence its success. Anatomical variations in the distance between the thoracolumbar interfascial plane and the skin at different lumbar levels can impact the clarity of ultrasound imaging, affecting both the ease of administering the block and its overall effectiveness (3). The ability to identify the lumbar level where the thoracolumbar interfascial plane is closest to the skin could facilitate a more straightforward and precise TLIP block application, potentially enhancing patient outcomes.

Advancements in ultrasound-guided techniques have expanded the use of peripheral nerve blocks, particularly interfascial plane blocks such as the thoracolumbar interfascial plane (TLIP) block, by enabling precise localization and effective administration (6,11,18). However, obesity presents unique challenges in the application of these blocks. Increased adipose tissue in obese patients can reduce ultrasound imaging clarity, complicate anatomical identification, and increase the distance between the skin and target planes, potentially compromising block efficacy and increasing procedural difficulty (16). As obesity rates continue to rise globally (7), optimizing block techniques for this patient population is essential to enhance both safety and effectiveness in clinical practice, underscoring the need for ongoing research in this area.

The primary objective of this study was to determine the optimal lumbar level for TLIP block application by identifying the location where the thoracolumbar interfascial plane is closest to the skin, as well as to evaluate the impact of patient positioning on ultrasound image quality and procedural feasibility. Additionally, the relationship between body mass index (BMI) and skin-to-plane distance was examined as a secondary outcome measure. These parameters were investigated to assess their influence on the feasibility and ultrasound imaging quality of TLIP block application at different lumbar levels. The aim was to provide further insights into how anatomical and position-dependent variables may affect the success of TLIP block procedures.

Materials and Methods

Ethical Approval and Registration

This study was approved by the Clinical Research Ethics Committee of Harran University Faculty of Medicine (Approval Date: April 10, 2023; Approval Number: 23.06.11). The sample size for the study was calculated using G-Power 3.1.9.7 software, with a 5% Type I error rate, 90% power, and a large effect size of 0.75, requiring 39 patients per group, for a total of 78 patients. Accordingly, data from a total of 80 patients were evaluated in our study.(14) All participants were provided with comprehensive information regarding the study's objectives and methodology. Informed consent was obtained through both oral and written agreements, and the study was conducted in accordance with the universal ethical principles outlined in the Declaration of Helsinki.

Inclusion and Exclusion Criteria

Participants aged 18 to 65, classified under ASA (American Society of Anesthesiologists) levels I–III, and scheduled for upper lumbar region surgeries were included in the study. Exclusion criteria encompassed individuals who were unwilling to participate, those for whom peripheral nerve blocks were contraindicated, uncooperative individuals, patients with physical disabilities that could interfere with the procedure, emergency cases, individuals with scoliosis, pregnant or breastfeeding women, patients with trauma or surgical scars in the area, and those classified as ASA levels IV or V.

Study Protocol

Participants' demographic characteristics were recorded, and they were placed in the preoperative anesthesia room without premedication. Ultrasound measurements of the thoracolumbar interfascial plane were performed in three positions:

1. ***Sitting*** - Participants were seated upright with their hands placed over their navel.
2. ***Lateral Decubitus*** - Participants lay on their left side with their hands positioned at their sides.
3. ***Prone*** - Participants lay face down with their heads turned to the left, and measurements were taken on the right side.

The T10, T11, T12, L1, L2, and L3 vertebrae were identified by counting down from the C7 vertebra and positioning a high-frequency (10-15 MHz) linear ultrasound probe along the spine. For each position, the spinous processes of L1 and L3 were located, and lateral measurements were marked 3 cm from these processes. The ultrasound probe was oriented transversely to visualize the subcutaneous tissue, multifidus, longissimus, and iliocostalis muscles. The distance between the skin surface and the middle of the thoracolumbar interfascial plane, located between the multifidus and longissimus muscles, was measured. Measurements were taken by freezing the ultrasound image at the point providing maximum clarity.

This methodology ensures precision in measuring the distance from the thoracolumbar interfascial plane to the skin under various conditions, allowing for an accurate assessment of the optimal lumbar level and patient position for TLIP block application.

Statistical Analysis

All statistical analyses were performed using SPSS version 26 (IBM Corp., Armonk, NY). Descriptive statistics, including mean, standard deviation, median, frequency, percentage, minimum, and maximum values, were calculated for all variables. The normality of quantitative data was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. For comparisons of three or more dependent variables showing normal distribution, repeated-measures analysis of variance was used, with Bonferroni correction applied for post hoc pairwise comparisons. For variables not normally distributed, the Wilcoxon signed-ranks test was used for two-group comparisons, and the Friedman test with Bonferroni-corrected Dunn test was employed for three or more groups. Pearson and Spearman correlation analyses were used to examine relationships between quantitative variables. Statistical significance was set at $p < 0.05$.

Results

Of the 88 patients initially assessed for eligibility (44 females and 44 males), eight were excluded: four females declined consent, and four males experienced vagal stimulation during position changes. Consequently, the study was conducted with 80 participants, evenly distributed by gender, with 40 females (50%) and 40 males (50%) (Figure 1).

The ages of participants ranged from 18 to 74 years, with a mean age of 42.71 ± 15.08 years. Body mass index (BMI) values spanned from 18.8 to 42.7 kg/m², with an average of 28.68 ± 4.56 kg/m². Of the participants, 18.8% (n=15) had a normal weight, 43.8% (n=35) were classified as overweight, and 37.5% (n=30) were classified as obese (Table 1).

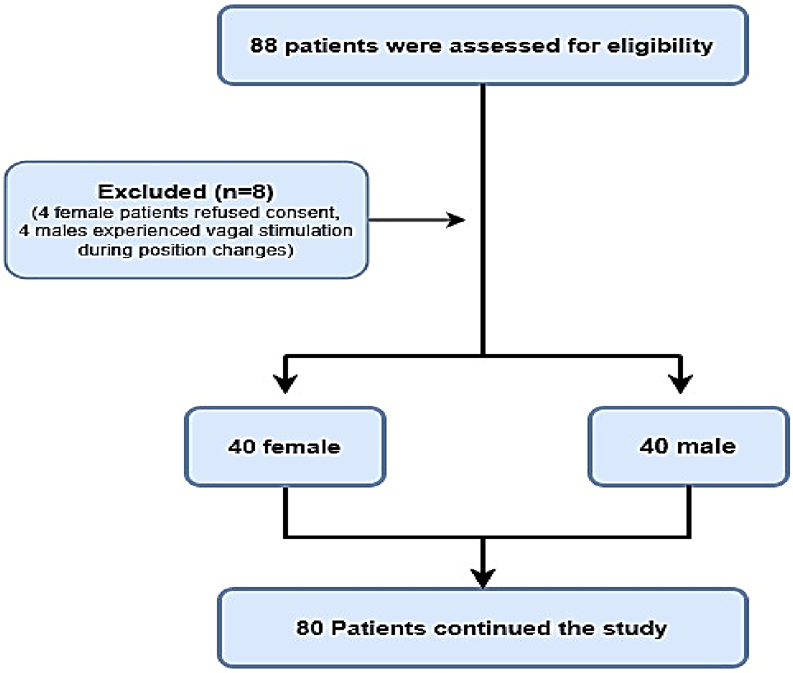

Figure 1. Flow diagram

Table 1. Distribution of Demographic Characteristics

Age	*Mv ± Sd* *Median (Min - max)*	42,71±15,08 42 (18-74)
Gender	*Female* *Male*	40 (50,0) 40 (50,0)
BMI	*Mv ± Sd* *Median (Min - max)*	28,68±4,56 28,2 (18,8-42,7) *Normal weight: 15 (18,8)* *Overweight: 35 (43,8)* *Obese: 30 (37,5)*

Mv: Mean value, Sd: Standard deviation BMI: Body mass index

In the sitting position, the thoracolumbar fascial plane at the L1 lumbar level was positioned 0.81 ± 0.82 mm closer to the skin compared to the L3 level, a difference that was statistically significant (p=0.001; p<0.01). In the lateral position, this distance at the L1 level was 0.72 ± 1.05 mm less than at the L3 level, also statistically significant (p=0.001; p<0.01). Similarly, in the prone position, the thoracolumbar fascial plane at L1 was 0.95 ± 0.83 mm closer to the skin than at L3 (p=0.001; p<0.01). Furthermore, significant differences in the distance to the skin at the L1 level were observed among the sitting, lateral, and prone positions (p=0.001; p<0.01). Pairwise comparisons revealed that the distance from the thoracolumbar fascial plane to the skin was, on average, 0.77 ± 1.35 mm greater in the sitting position and 0.72 ± 1.46 mm greater in the lateral position compared to the prone position (p=0.001; p<0.01) (Table 2).

Table 2. Analysis of Thoracolumbar Fascial Plane-to-Skin Distance (mm) by Position and Lumbar Level

		L1	**L3**	**Distance**	***p***
Sitting	*Mv ± Sd* *Median (Min - Max)*	17,00±2,54 16,3(12,5-27)	17,80±2,49 17,5 (13,9-25,1)	-0,81±0,82 -0,7 (-3,6-2,6)	ᵃ0,001**
Lateral	*Mv ± Sd* *Median (Min -Max)*	16,94±2,37 16,5 (12,6-25,9)	17,66±2,14 17,4 (14-23,2)	-0,72±1,05 -0,7 (-3,6-5,4)	ᵃ 0,001**
Prone	*Mv ± Sd* *Median (Min - Max)*	16,23±2,22 15,8 (12,2 23,5)	17,18±2,27 17 (13-24)	-0,95±0,83 -0,65 (-4,2-0,5)	ᵃ0,001**
Sitting-Lateral	*Mv ± Sd* *Median (Min - Max)*	0,05±1,66 0,1 (-10,2-6,1)	0,14±1,33 -0,1 (-2,2-7,5)		
	p	***bb0,969***	***cc1,000***		
Sitting-Pron	*Mv ± Sd* *Median (Min –Max)*	0,77±1,35 0,55 (-1,9-9,2)	0,62±1,42 0,5 (-1,7-9,6)		
	p	***bb0,001****	***cc0,001****		
Lateral-Pron	*Mv ± Sd* *Median (Min –Max)*	0,72±1,46 0,5 (-1,8-11,1)	0,49±0,95 0,5 (-4,0-3,5)		
	p	***bb0,001****	***cc0,001****		

*[a] Wilcoxon Signed Ranks Test [b]Friedman's Test&Dunn-Bonferroni Test [c]Repeated Measure&Bonferroni Test **p<0,01*

A statistically significant, moderate positive correlation was observed between participants' BMI and the distance from the thoracolumbar fascial plane to the skin at both L1 and L3 lumbar levels across the sitting, lateral, and prone positions, indicating that this distance increases as BMI rises (Table 3). Conversely, no statistically significant correlation was found between participants' age and the thoracolumbar fascial plane-to-skin distance at the L1 and L3 levels in the sitting and lateral positions (p>0.05) (Table 3).

Table 3. Analysis of the Association Between Thoracolumbar Fascial Plane-to-Skin Distance and Age and BMI Across Different Positions and Lumbar Levels

		Age		**BMI**	
		r	***p***	**r**	***p***
Sitting	**L1**	0,207[d]	***0,066***	0,436[d]	***0,001****
	L3	0,212[e]	***0,059***	0,470[e]	***0,001****
Lateral	**L1**	0,174[d]	***0,123***	0,529[d]	***0,001****
	L3	0,204[e]	***0,070***	0,507[e]	***0,001****
Prone	**L1**	0,312[d]	***0,005****	0,516[d]	***0,001****
	L3	0,254[e]	***0,023****	0,490[e]	***0,001****

*[d]r= Spearman's Correlation Coefficient [e]r=Pearson Correlation Coefficient *p<0,05 **p<0,01*

In normal-weight subjects, the distance from the thoracolumbar fascial plane to the skin at the L1 lumbar level was significantly shorter than at the L3 level across sitting, lateral, and prone positions (p=0.001; p<0.01). At L1, significant differences were observed between sitting, lateral, and prone positions, with pairwise comparisons indicating that the distance in the sitting position was 0.81 ± 0.71 mm greater than in the prone position (p=0.001; p<0.01) and 0.49 ± 0.44 mm greater in the lateral position compared to prone (p=0.019; p<0.05) (Table 4). No significant differences were found between positions at the L3 level for normal-weight subjects (p>0.05) (Table 4).

Table 4. Analysis of Thoracolumbar Fascial Plane-to-Skin Distance (mm) by Position, Lumbar Level, and BMI Category

			L1	L3	Distance	p
Normal Weight	**Sitting**	*Mv ± Sd*	15,21±1,68	15,99±1,82	-0,78±0,53	[a]0,001**
		Median (Min - Max)	14,9 (12,5-18,6)	15,4 (13,9-19,2)	-0,7 (-1,9--0,2)	
	Lateral	*Mv ± Sd*	14,89±1,24	15,94±1,61	-1,05±0,67	[a]0,001**
		Median (Min - Max)	14,7 (12,6-16,8)	15,3 (14-19,1)	-0,8 (-2,3--0,2)	
	Prone	*Mv ± Sd*	14,39±1,16	15,45±1,54	-1,05±0,88	[a]0,001**
		Median (Min - Max)	14,4 (12,2-16,3)	15,1 (13-17,8)	-0,8 (-2,3-0,3)	
		p	[b]0,001**	[c]0,099		
	Sitting- Lateral	*Mv ± Sd*	0,32±0,72	0,05±0,52		
		Median (Min - Max)	0,2 (-0,3-2,6)	0,1 (-0,8-1,2)		
		p	[bb]0,820	[cc]1,000		
	Sitting-Prone	*Mv ± Sd*	0,81±0,71	0,54±1,00		
		Median (Min - Max)	0,5 (-0,1-2,3)	0,4 (-1,1-3,1)		
		p	[bb]0,001**	[cc]0,163		
	Lateral-Prone	*Mv ± Sd*	0,49±0,44	0,49±0,78		
		Median (Min - Max)	0,4 (-0,3-1,2)	0,4 (-1,4-1,9)		
		p	[bb]0,019*	[cc]0,084		
Over weight	**Sitting**	*Mv ± Sd*	16,86±2,01	17,58±2,22	-0,72±0,77	[a]0,001**
		Median (Min - Max)	17 (13,9-21,4)	17,1 (14,3-23,8)	-0,6 (-3,3-0,8)	
	Lateral	*Mv ± Sd*	16,66±1,6	17,34±1,68	-0,67±0,88	[a]0,001**
		Median (Min - Max)	16,4 (14,3-20,7)	17,1 (14,7-21,5)	-0,7 (-3,6-1,8)	
	Prone	*Mv ± Sd*	16,14±1,78	16,93±1,9	-0,79±0,58	[a]0,001**
		Median (Min - Max)	15,8 (13-20,7)	17 (13-21,2)	-0,6 (-2,5-0,5)	
		p	[b]0,001**	[c]0,006**		
	Sitting- Lateral	*Mv ± Sd*	0,19±0,96	0,24±1,24		
		Median (Min - Max)	0,2 (-1,8-3,7)	-0,1 (-1,6-4,6)		
		p	[bb]0,929	[cc]0,764		
	Sitting-Prone	*Mv ± Sd*	0,72±1,00	0,65±1,10		
		Median (Min - Max)	0,7 (-1,4-3,5)	0,5 (-1,3-4,1)		
		p	[bb]0,001**	[cc]0,004**		
	Lateral-Prone	*Mv ± Sd*	0,52±1,01	0,41±1,15		
		Median (Min - Max)	0,5 (-1,8-3,8)	0,5 (-4-3,5)		
		p	[bb]0,001**	[cc]0,127		
Obese	**Sitting**	*Mv ± Sd*	18,05±2,94	18,96±2,52	-0,91±0,99	[a]0,001**
		Median (Min - Max)	16,9 (15,2-27)	18,5 (15,8-25,1)	-0,8 (-3,6-2,6)	
	Lateral	*Mv ± Sd*	18,29±2,71	18,91±2,16	-0,61±1,34	[a]0,001**
		Median (Min - Max)	18,1 (14,6-25,9)	18,9 (15,1-23,2)	-0,7 (-2,5-5,4)	
	Prone	*Mv ± Sd*	17,24±2,49	18,33±2,37	-1,09±1,03	[a]0,001**
		Median (Min - Max)	16,5 (13,5-23,5)	18,2 (15-24)	-0,6 (-4,2--0,2)	
		p	[b]0,001**	[c]0,002**		
	Sitting- Lateral	*Mv ± Sd*	-0,24±2,46	0,06±1,69		
		Median (Min - Max)	0 (-10,2-6,1)	-0,25 (-2,2-7,5)		
		p	[bb]1,000	[cc]1,000		
	Sitting-Prone	*Mv ± Sd*	0,81±1,88	0,63±1,89		
		Median (Min - Max)	0,4 (-1,9-9,2)	0,45 (-1,7-9,6)		
		p	[bb]0,001**	[cc]0,233		
	Lateral-Prone	*Mv ± Sd*	1,05±2,08	0,57±0,77		
		Median (Min - Max)	0,6 (-1,2-11,1)	0,5 (-0,8-2,5)		
		p	[bb]0,001**	[cc]0,001**		

*[a]Wilcoxon Signed Ranks Test [b]Friedman's Test&Dunn-Bonferroni Test [c]Repeated Measure&Bonferroni Test *p<0,05 **p<0,01*

In overweight participants, the thoracolumbar fascial plane was also significantly closer to the skin at L1 than at L3 across all positions (p=0.001; p<0.01). At L1, pairwise comparisons showed that the distance in the sitting position was 0.72±1.00 mm greater than in prone (p=0.001; p<0.01) and 0.52±1.01 mm greater in the lateral position compared to prone (p=0.001; p<0.01) (Table 4). At L3, significant differences between sitting, lateral, and prone positions were observed, with the sitting position showing a 0.65±1.10 mm greater distance than prone (p=0.004; p<0.01) (Table 4).

In obese subjects, the L1 level showed significantly shorter distances from the thoracolumbar fascial plane to the skin across all positions (p=0.001; p<0.01). At L1, the distance was significantly higher in the sitting position (0.81 ± 1.88 mm) and in the lateral position (1.05 ± 2.08 mm) compared to prone (p=0.001; p<0.01) (Table 4). At L3, a significant difference was found between positions, with the lateral position showing an average 0.57 ± 0.77 mm greater distance than prone (p=0.001; p<0.01) (Table 4).

Discussion

In this study, we assessed the distance from the thoracolumbar interfascial plane to the skin across three patient positions (prone, lateral, and sitting) using ultrasound guidance in 80 patients, without needle insertion. Our findings revealed that the prone position offered the most stable probe placement, enhanced patient comfort, and provided superior ultrasound imaging quality. This position facilitated clearer visualization of the multifidus, longissimus, and iliocostalis muscles, as well as relevant spinous and transverse processes, critical for precise block placement. In contrast, the sitting position was the least favorable, resulting in poor ultrasound image quality and reduced patient comfort. These findings are particularly relevant for obese patients, where additional adipose tissue can further obscure imaging; thus, the prone position may offer advantages in improving image clarity and procedural ease in this population..

As regional anesthesia has advanced, various fascial plane blocks have gained prominence, with the TLIP block, introduced by Hand et al. in 2015, being increasingly favored due to its efficacy in achieving long-lasting analgesia with a low complication rate (1,9). Applied through ultrasound guidance, the TLIP block has demonstrated effective postoperative analgesia, especially in spine surgeries in the thoracolumbar region, as it blocks the dorsal branches of the thoracolumbar nerves (1,15,17,21). Additionally, it is considered beneficial in cases of chronic lower back pain, minimally invasive spine surgeries, and procedures at the L2 and L3 vertebrae (2). The TLIP block is an ultrasound-guided technique that, to date, has not been associated with any reported complications in the literature. However, potential complications, if they occur, are considered likely to be similar to those seen with the erector spinae plane block (ESP-B) (19).

Studies have shown that TLIP block significantly reduces opioid consumption and postoperative pain intensity within 24 hours following surgery, as well as postoperative nausea and other opioid-related side effects, although not affecting vomiting, pruritus, or respiratory issues (17). In a randomized study by Çiftçi et al., TLIP block provided effective analgesia comparable to ESP block in lumbar discectomy patients, while Pavithran et al. reported lower VAS scores and reduced opioid doses with TLIP block compared to wound infiltration (4,15). Another study indicated that TLIP block, while comparable to ESP block in IL-6 and IL-10 levels, extended the duration of analgesia, making it suitable for perioperative pain management in posterior stabilization and decompression surgeries (12).

Further studies, including a case series by Xu et al., revealed that modified TLIP (m-TLIP) block offered effective analgesia for up to 48 hours at rest and 24 hours with movement following bilateral 20 ml application (21). TLIP block has also shown potential to provide 24-hour pain relief after lumbar laminoplasty by affecting the dorsal branches of the lumbar nerve (1).

In performing peripheral nerve blocks, obesity introduces significant challenges that can affect both procedural success and patient safety. The increased adipose tissue in obese individuals often limits ultrasound imaging clarity, complicating the visualization of critical anatomical landmarks and increasing the distance between the skin and target fascial planes (16,20). This additional tissue depth, particularly noticeable at the L3 vertebra level due to excess fat, can reduce block efficacy and extend procedure time. Our findings indicate that as BMI rises, the thoracolumbar interfascial plane distance from the skin increases across all positions. Notably, the prone position provided the clearest ultrasound image, suggesting that this positioning may facilitate easier block application in obese patients by reducing the skin-to-plane distance and potentially lowering complication risks. These insights emphasize the need to tailor nerve block techniques to anatomical variations in obese patients, which could improve both imaging quality and procedural outcomes.

The TLIP block can be administered in the prone, lateral, and sitting positions, though the lateral or prone positions are generally preferred for their stability and enhanced ultrasound visualization, which assists in maintaining needle visibility within the ultrasound field (10,15). However, the prone position carries specific risks, particularly in anesthetized patients, where it can increase the likelihood of complications such as dislodgement of intubation tubes or ventilator circuits, a concern that is especially relevant for geriatric, obese, and overweight patients (10,13). Consequently, performing such blocks preoperatively, prior to induction of anesthesia, may reduce these risks and offer a safer approach for these vulnerable populations.

Limitations

This study has several limitations. First, the sample size, though sufficient for initial findings, may limit the generalizability of the results across diverse patient populations. Second, while we assessed the impact of BMI on TLIP block feasibility, further stratification by obesity severity could provide deeper insights. Finally, the study did not include direct assessments of block efficacy in postoperative pain management, which would be valuable in understanding the clinical implications of different patient positions. Future studies with larger cohorts and additional outcome measures could further validate and expand upon our findings.

Conclusion

Position and BMI Influence Block Application

Our findings show that both patient position and BMI significantly affect the proximity of the thoracolumbar interfascial plane to the skin, impacting the ease of block application and potential complication risks.

Prone Position Advantage at L1 Level

The prone position at the L1 lumbar level provided the closest skin-to-plane distance, resulting in clearer ultrasound imaging and safer procedural conditions.

Obesity and Positioning

The prone position demonstrated imaging advantages, particularly for obese patients, by reducing the distance and improving visualization of anatomical landmarks.

Need for Further Research

While these results highlight the importance of positioning and BMI, further studies are needed to confirm these findings and refine clinical practice recommendations for TLIP block applications.

Ethical Approval: *This study was approved by the Clinical Research Ethics Committee of Harran University Faculty of Medicine (Approval Date: April 10, 2023; Approval Number: 23.06.11).*

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