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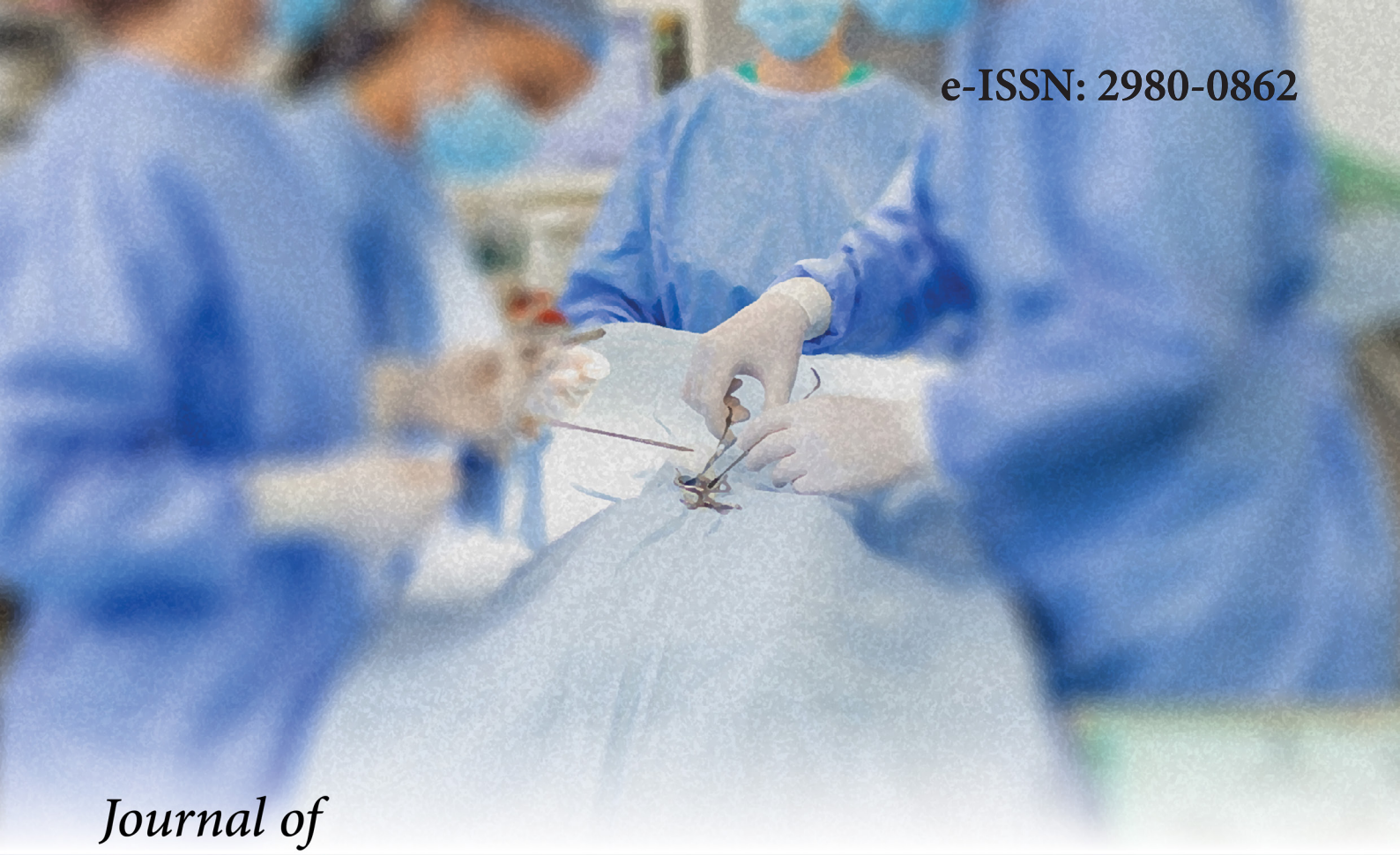

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EDITORIAL

Dear Colleagues,

The field of surgery continues to evolve rapidly, with groundbreaking advancements and innovative techniques being introduced regularly. In this dynamic landscape, it is essential to have a reliable source of information that disseminates the latest scientific and clinical knowledge to surgeons and healthcare professionals. The Journal of Comprehensive Surgery emerges as a prominent publication that caters to the diverse surgical disciplines, offering a platform for sharing research, insights, and advancements across a wide spectrum of specialties.

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In conclusion, the Journal of Comprehensive Surgery plays a vital role in advancing the field of surgery by providing a platform for surgeons and researchers to share their knowledge, experiences, and innovations. Its broad scope, commitment to quality, global outlook, and integration of digital tools make it an indispensable resource for the surgical community. As we navigate the ever-changing landscape of surgery, the Journal of Comprehensive Surgery stands as a beacon of knowledge and collaboration, empowering surgeons to push the boundaries of what is possible in the field of surgical science and practice.

Best Regards,

Alparslan KOÇ, MD
Editor

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Clinical and ophthalmological findings in patients with Behçet's uveitis at first presentation

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ABSTRACT

Aims: The present study attempted to demonstrate the clinical, demographic, and ophthalmological findings of patients with Behçet's disease (BD) at first admission and relevant treatment modalities.

Methods: We considered 161 eyes of 103 patients applying to the Uvea Unit of Ulucanlar Eye Training and Research Hospital between 2000-2012 and already suffering from BD or diagnosed with BD at their follow-ups. Then, we retrospectively investigated their clinical, demographic, and ophthalmological findings at first admission and the treatment modalities with the help of their medical records.

Results: There were 70 (68%) male and 33 (32%) female patients, and 17 patients (16.5%) initially presented with ocular symptoms. While the patients' mean diagnosis age was 26.79±9.24 years (4-61 years), it was 29.52±9.49 years (6-62 years) at the first eye attack. Eye involvement was bilateral in 58 patients (56.3%) and unilateral in 45 (43.7%). About half of the eyes (55.9%) were presented as panuveitis, 22.4% as posterior uveitis, 15.5% as anterior uveitis, and 6.2% as intermediate uveitis. While there were anterior chamber reaction + vitritis + retinitis and/or vasculitis (panuveitis) in 90 (55.9%) eyes, the others were characterized by isolated retinitis (12.4%) and isolated iridocyclitis (8.7%). Only two eyes (0.1%) had hypopyon at admission. We discovered at least one complication in 111 eyes (68.9%) at first admission. In particular, the most prevalent complication was found to be isolated macular edema in 45 eyes (28%) and isolated cataracts in 17 eyes (10.6%). On the other hand, topical steroid + systemic steroid + immunosuppressive (23.6%), topical + systemic steroid (16.8%), and systemic steroid + immunosuppressive (11.8%) became the most prevalently adopted medical treatments (with additions/alterations) at first admission, respectively.

Conclusion: In a nutshell, BD is considered a multisystemic condition with frequent ocular manifestations. BD-associated uveitis often presents as panuveitis. Thus, early and efficient treatment of ocular complications seems to be critical for better visual prognosis.

Keywords: Behçet's disease, first presentation, uveitis

INTRODUCTION

Affecting multiple organ systems, Behçet's Disease (BD) is a chronic condition first described in 1937, particularly seen in Mediterranean, Middle East, and Far East countries, the etiology of which has not been fully elucidated yet.[1] The previous research reported its prevalence to be 20-420/100,000 in Türkiye, 0.12-0.33/100,000 in the United States, and 0.64/100,000 in the United Kingdom.[2,3] As it can be diagnosed in the pediatric age group and older adults, it prevalently occurs among those aged 25-30 years. Moreover, males are predisposed to this disorder.[2]

The most apparent underlying pathology in BD may be the development of a vasculitis that affects the arterial and vein systems of all sizes (particularly veins) and causes occlusion and necrosis in these vessels, which, in turn, harms an entire organ system.[4,5] Despite affecting all organ systems, BD presents especially with oral and genital ulcerations, ocular inflammation, and skin lesions.[2]

A wide variety of ocular findings (e.g., episcleritis, scleritis, and extraocular muscle paralysis) are likely to be present in about 70% of BD patients, but its major presentation is uveitis with recurrent attacks.[4,6-9] It may be unilateral or bilateral and may harm the anterior and posterior segments of the eye (anterior uveitis, intermediate uveitis, posterior uveitis, panuveitis).[10-12]

The present research was to reveal the clinical and demographic characteristics and complications of patients with known BD or diagnosed with BD after an attack of uveitis, the treatment modalities, and their accompanying systemic characteristics and to explore the interactions between these variables.

METHODS

This study was produced from the thesis, ethics committee approval is not required at that tim. Institutional approval has been obtained. We retrospectively investigated the medical records of 103 patients applying to the Uvea Unit of Ulucanlar Eye Training and Research Hospital between 2000-2012 and already suffering from BD or diagnosed with BD at their follow-ups. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

We retrospectively investigated the medical records of 103 patients applying to the Uvea Unit of Ulucanlar Eye Training and Research Hospital between 2000-2012 and already suffering from BD or diagnosed with BD at their follow-ups. In this regard, we included and classified 161 eyes of these patients based on the criteria proposed by the Standardization of Uveitis Nomenclature (SUN) working group.[13] The study was carried out in accordance with the Helsinki declaration. Due to the retrospective nature of the study, we did not obtain patient consent. The patients were diagnosed with Ocular BD based on the criteria offered by the International Study Group for Behçet's Disease and the findings consistent with the disease (e.g., diffuse vitritis, non-granulomatous pattern, retinal vasculitis, retinal vascular occlusion).[14] When necessary, a multidisciplinary approach was adopted with rheumatology, dermatology, and other relevant departments.

The patients' demographic characteristics (age, sex), anterior and dilated posterior segment examinations, first best corrected visual acuity (BCVA), intraocular pressure (with applanation tonometry), advanced complications, pre- and post-admission treatments, family history, extraocular findings, age at the first eye attack and pathergy results were recorded at their first admission. Visual acuity was measured with the Snellen chart and corrected according to LogMAR (logarithm of the minimum angle of resolution). High intraocular pressure was evaluated as a measurement over 21 mmHg by applanation tonometry. Besides, azathioprine, cyclosporine, and mycophenolate mofetil were grouped as immunosuppressive drugs. Finally, Optical Coherence Tomography (OCT) and Fundus Fluorescein Angiography (FFA) were performed on all patients.

This article was produced from the specialty thesis titled Clinical and Ophthalmological Findings at First Admission in Patients with Behçet's Uveitis in 2012.

Statistical Analysis

We tested the normality of the data distribution with the Kolmogorov-Smirnov test. While normally-distributed continıus data are shown as means and standard deviations, categorical data are presented as numbers and percentages. We compared the categorical data using the chi-square test (Yates continuity corrected chi-square test and Fisher's exact test). Besides, we utilized Welch's ANOVA to make comparisons of continuous data due to the heterogeneous variances. All statistical analyses were performed on the SPSS 16.0 (Statistical Package for Social Sciences) program, and a p-value of < 0.05 was accepted as statistically significant.

RESULTS

There were 70 (68%) male and 33 (32%) female patients, and 17 patients (16.5%) initially presented with ocular symptoms. While the patients' mean age at the diagnosis of BD was 26.79±9.24 years (4-61 years), it was 29.52±9.49 years (6-62 years) at the first attack. While the mean age at diagnosis and the first eye attack were found to be 27.36±12.43 years (4-61 years) and 30.63±12.20 years (6-62 years) for females, these values became 26.51±7.35 years (10-42 years) and 29.0±7.95 years (13-50 years) for males, respectively. The patients had their first eye attack an average of 2.74±9.36 years after the diagnosis. In this regard, the mean time from diagnosis to the first eye attack was found to be 2.49±7.65 years for males and 3.27±12.30 for females. However, we could not conclude a significant difference between the age at diagnosis and the age of the first attack for both males and females (p=0.718 and 0.486, respectively). Besides, eye involvement was discovered to be bilateral in 58 patients (56.3%) and unilateral in 45 patients (43.7%). Behçet's uveitis was observed bilaterally in 51.5% of the females and 58.5% of the male patients. Yet, there was no statistically significant difference in laterality by sex (p=0.563) (**Table 1**). Thrity-six eyes (22.4%) had a LogMAR of > 1, 48 (29.8%) had a LogMAR of 0.4-1, and 77 (47.8%) had a LogMAR of < 0.4.

Table 1: Patients' Demographic and Clinical Characteristics

	Female	Male
Number (n)	33 (32%)	70 (68%)
Age of diagnosis	27.36±12.43 years (4-61)	26.51±7.35 years (10-42)
Age of the first eye attack	30.63±12.20 years (6-62)	29.0±7.95 (13-50 years)
Time between the diagnosis and the first attack	3.27±12.30 years	2.49±7.65 years
Laterality		
Unilateral	48.5%	41.5%
Bilateral	51.5%	58.5%

About half of the eyes (55.9%) presented as panuveitis, 22.4% as posterior uveitis, 15.5% as anterior uveitis, and 6.2% as intermediate uveitis. Panuveitis was the significantly most prevalent presentation in both males and females (p=0.001). The exact rates were found to be 36% among females and 64.9% among males (**Table 2**).

Table 2: Uveitic Presentation by Sex

Anatomical Location	Females (50 eyes)	Males (111 eyes)
Anterior	15 (30%)	10 (9%)
Intermediate	4 (8%)	6 (5.4%)
Posterior	13 (26%)	23 (20.7%)
Panuveitis	18 (36%)	72 (64.9%)

Among the patients, the mean age of the first eye attack was 26.88±10.70 years (6-44 years) for those with anterior uveitis, 38.5±12.57 years (25-53 years) for those with intermediate uveitis, 28.17±7.11 years (13-42 years) for those with posterior uveitis, and 29.66±9.18 years (6-62 years) for those with panuveitis. However, we could conclude no significant difference between the mentioned ages by anatomical localization of BD (p=0.082).

While most of the uveitis in all localizations (72% of intermediate uveitis, 60% of intermediate uveitis, 55.6% of posterior uveitis, and 80% of panuveitis) were bilateral, 62.1% of bilateral and 40% of unilateral cases were panuveitis. In this sense, panuveitis had a statistically significant bilateral course (p=0.038).

While there were anterior chamber reaction + vitritis + retinitis and/or vasculitis (panuveitis) in 90 (55.9%) eyes, the others were characterized by isolated retinitis (12.4%) and isolated iridocyclitis (8.7%). Only two eyes (0.1%) had hypopyon at admission (**Table 3**).

We discovered at least one complication in 111 eyes (68.9%) at first admission. In particular, the most prevalent complication was found to be isolated macular edema in 45 eyes (28%) and isolated cataracts in 17 eyes (10.6%) (**Table 4**). There was panuveitis in 65.8% of the eyes with complications, posterior uveitis in 26.1%, anterior uveitis in 7.2%, and intermediate uveitis in 0.9%. The probability of developing complications at first admission was significantly higher in the eyes with panuveitis compared to those with other anatomical involvements (p<0.001).

Table 3: Ocular Findings at First Presentation

Clinical Findings	Eyes (n)
Anterior chamber reaction + Vitritis + Retinitis and/or Vasculitis (Panuveitis)	90 (55.9%)
Retinitis	20 (12.4%)
Iridocyclitis	14 (8.7%)
Iridocyclitis + Vitritis	11 (6.8%)
Vitritis	10 (6.2%)
Vitritis + Retinitis	9 (5.6%)
Vasculitis	7 (4.3%)

Table 4: Complications at First Presentation

Complications	Eyes (n)
N/A	50 (31.1%)
Macular Edema	45 (28%)
Cataract	17 (10.6%)
Posterior synechiae	12 (7.5%)
Macular Edema + Papilledema	8 (5%)
Retinal Vein Occlusion	8 (5%)
Papilledema	5 (3.1%)
Retinal Hemorrhage	5 (3.1%)
Vitreous Hemorrhage	4 (2.5%)
Papillitis	2 (1.2%)
Cataract + Macular Edema	2 (1.2%)
Glaucoma + Macular Edema	1 (0.6%)
Papilledema + Vitreous Hemorrhage	1 (0.6%)
Optic Atrophy	1 (0.6%)

Before admission to our hospital, 72 of 161 eyes had received or were receiving one or more medical treatments. The following treatment modalities had been or were being applied for them: colchicine (20.5%), topical steroid (6.8%), and colchicine plus topical and systemic steroid treatment (4.3%). On the other hand, topical steroid + systemic steroid + immunosuppressive (23.6%), topical + systemic steroid (16.8%), and systemic steroid + immunosuppressive (11.8%) became the most prevalently adopted medical treatments (with additions/alterations) at first admission, respectively. (**Table 5**). However, no patient was taken for surgery at first admission. Before admission, phacoemulsification + intraocular lens implantation was performed in 7 eyes (4.3%), while one patient (0.6%) underwent phacoemulsification + intraocular lens implantation + vitreoretinal surgery due to vitreous hemorrhage.

Among 63 patients with a known pathergy test result, 28 (44.4%) were pathergy positive. We discovered panuveitis in 67.9% of them, anterior uveitis in 21.4%, and posterior uveitis in 10.4%. Thus, pathergy positivity was found to be significantly higher in patients with panuveitis (p=0.036). Besides, as the initial sign of BD, 76.7% of the patients suffered from oral aphthae, 16.5% from ocular involvement, and 5.8% from genital ulcer (**Table 6**). Almost all patients (94.2%) had a history of at least one oral aphthae. In addition, 8 patients (7.8%) had a family history of BD; interestingly, all these patients were males (11.4%). Nevertheless, the family history of BD did not significantly differ by sex (p=0.052). While there was a family history of BD in 2 patients with anterior uveitis (12.5%), 4 patients with panuveitis (7.5%), and 2 patients with posterior uveitis (7.4%), it was not the case for the patients with intermediate uveitis. The findings yielded no difference in the anatomical localization of the uveitis by family history of BD (p=0.875).

Table 5: Treatment Modalities Used in Behçet's Disease Associated Uveitis

Treatment Modality	Medical Treatments at Preadmission	Medical Treatments at First Admission
N/A	55.3%	3.1%
Colchicine	20.5%	
Topical Steroid	6.8%	7.5%
Colchicine + Topical Steroid + Systemic Steroid	4.3%	-
Topical Steroid + Retrobulbar Steroid + Systemic Steroid + Immunosuppressive	3.1%	-
Colchicine + Immunosuppressive	2.5%	3.1%
Immunosuppressive	2.5%	8.1%
Topical Steroid + Systemic Steroid	1.9%	16.8%
Topical Steroid + Intravitreal Steroid + Systemic Steroid	1.9%	-
Colchicine + Topical Steroid	1.2%	-
Topical Steroid + Systemic Steroid + Immunosuppressive	-	23.6%
Systemic Steroid + Immunosuppressive	-	11.8%
Retrobulbar Steroid	-	6.8%
Topical Steroid + Retrobulbar Steroid + Systemic Steroid	-	6.8%
Retrobulbar Steroid + Immunosuppressive	-	3.7%
Systemic Steroid	-	2.5%
Colchicine + Topical Steroid	-	2.5%
Topical Steroid + Immunosuppressive	-	2.5%
Colchicine + Systemic Steroid + Immunosuppressive	-	0.6%
Retrobulbar Steroid + Systemic Steroid + Immunosuppressive	-	0.6%

Table 6: Behçet's Disease First Symptom

Symptom	n
Oral Aphthae	79 (76.7%)
Eye Finding	17 (16.5%)
Genital Aphthae	6 (5.8%)
Skin Finding	1 (1%)

DISCUSSION

BD is a systemic condition that affects the eyes rather prevalently and may result in permanent vision loss.[15] The emergence of systemic symptoms of the disease is often followed by uveitis within a few years in 10% to 20% of the patients and an average of four years in 60% to 80%.[2,4,16] BD-related uveitis often appears in the late 20s and early 30s.[2,10,17,18] Despite research reporting males' predisposition to BD, the literature also hosts a study indicating no significant sex-associated difference in the condition. Yet, the mentioned research also noted that the sex-related insignificance might depend on the sample size.[2,10,18] In this study, we found that

the mean age of the first diagnosis was 26.79±9.24 years and that the first eye attack occurred 2.74±9.36 years after diagnosis. Our findings overlap with the previous results in the literature. In general, 20% of BD patients first present with ocular inflammation.[19,20] We found that 16.5% of the patients first applied to our clinic with ocular findings and were diagnosed with BD.

While BD-associated uveitis often presents as bilateral and panuveitis, there are also presentations as unilateral and as anterior and intermediate uveitis.[10,15,21,22] In our study, 56.3% of the patients had bilateral uveitis. Despite the predominance of panuveitis, we discovered the presence of all uveitis presentations in our research. Moreover, we found that panuveitis was significantly bilateral (p=0.038) and was significantly higher in both males and females (p=0.001).

Typical ocular manifestations of BD are non-granulomatous panuveitis and retinal vasculitis.[23] Krause et al.[24] reported the most prevalent first ocular finding to be panuveitis (67.8%), followed by retinal vasculitis (16.0%) and iridocyclitis (13.9) and found hypopyon (0.7%) to be rare as a manifestation. Similarly, we discovered that the most prevalent finding at first admission was panuveitis (55.9%) and that iridocyclitis with hypopyon was present in only two eyes (0.1%) as an initial finding.

Macular edema, cataract, posterior synechia, and glaucoma are known to be the leading complications in BD-related uveitis that may cause reversible or permanent vision loss.[10,17,24] In this study, 111 eyes (68.9%) had at least one complication, and the most prevalent complication was found to be isolated macular edema in 45 eyes (28%), isolated cataract in 17 eyes (10.6%), and posterior synechia in 12 eyes (7.5%), overlapping with the literature. In addition, we found that the probability of complication development at first admission was significantly higher in eyes with panuveitis than those with other anatomical involvements, which may be because panuveitis affects all uveal regions, increasing the possibility of complications in all segments of the eye. On the other hand, we discovered glaucoma in only one patient, possibly because we considered the data at the time of admission but excluded follow-up data. We estimate that glaucoma may be more prevalent during follow-ups, depending on the nature of the disease and the steroid treatments used.

Steroid preparations (topical, periocular, and systemic), immunosuppressive agents, and biological agents are adopted in the treatment of BD-associated uveitis. Despite the robust efficacy of colchicine in skin lesions and joint inflammation, it has no significant effect in patients with uveitis. Thus, steroid preparations may be adopted as a primary treatment modality to suppress immediate inflammation. While steroid preparations can be applied topically in isolated anterior uveitis, periocular therapy can be preferred to systemic treatment in cases affecting the unilateral posterior segment. In addition, intravitreal steroid treatment in patients with treatment-resistant macular edema assists systemic treatment in suppressing inflammation and inhibiting macular edema. Immunosuppressive agents can be utilized in cases where the condition cannot be suppressed by steroid therapy due to their properties, such as reducing steroid-related side effects and helping early systemic immunosuppression. Biological agents are switched as a second step in refractory cases.[15] In our study, we uncovered that only retrobulbar steroid was administered to 11 eyes (6.8%) at first admission, but none of the patients received intravitreal steroid therapy at admission. Topical steroid + systemic steroid + immunosuppressive (23.6%), topical + systemic steroid (16.8%), and systemic steroid + immunosuppressive (11.8%) became the most prevalently adopted medical treatments (with additions/alterations) at first admission, respectively.

Some previous studies indicated that the history of oral aphthous ulcerations may reach 100% in patients with BD-associated uveitis.[10,22] We found this rate to be 94.2% in our study, which may be due to the inability of the patients to understand or remember the lesions described or the absence of ulcerations.

Limitations

Since the present study was performed retrospectively in a branch hospital and did not include follow-up data, it cannot offer information about visual prognosis, follow-up complications, and alterations in treatment modalities.

CONCLUSION

In a nutshell, BD is considered a multisystemic condition with frequent ocular manifestations. Although it is often presented as panuveitis, it can appear with a wide variety of ocular presentations, even with ocular findings at first admission. Thus, early and efficient treatment of ocular complications seems critical for better visual prognosis. A timely transition to immunosuppressive therapy - when needed - may be an effective method to alleviate steroid-related side effects and control inflammation.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was produced from the thesis, ethics committee approval is not required.

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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Retrospective analysis of percutaneous endoscopic gastrostomy cases in the endoscopy unit

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ABSTRACT

Aims: Enteral nutrition is considered a primary, first-choice nutrition method when the passage in the gastrointestinal tract is open. The present study attempted to present the experience of percutaneous endoscopic gastrostomy performed in our endoscopy unit.

Methods: This study investigated the data of 39 patients undergoing the placement of a percutaneous endoscopic gastrostomy (PEG) catheter in our endoscopy unit between July 2019 and November 2020. A team of experienced specialists, assistant physicians, and nurses performed the procedure at the bedside for patients intubated in the intensive care unit or with a poor general condition or in the endoscopy unit for other patients after being sedated by the anesthesiologist. The patients were started to be fed through the PEG catheter with an initial dose of 10 cc/hour, correlated with the clinical nutrition unit, at the 6th and 12th hours following the procedure, and the dose was gradually increased to the target dose. The patients' data were presented as frequencies and percentages (%).

Results: The data of 39 patients, 17 (44%) females and 22 (56%) males, were retrospectively investigated in this study. The median age of the patients was found to be 67 years (21-102 years). While 32 patients were hospitalized in the intensive care unit, four received palliative care, and three were followed up in the clinic wards. Considering the pathologies leading to the indication of PEG catheter placement, 15 patients had Cerebrovascular disease, 12 had Alzheimer's disease, 4 had absent swallow reflex, 3 had a subarachnoid hemorrhage, 2 had a hypoxic brain, 1 had spastic cerebral palsy, 1 had Sanfilippo syndrome, and 1 had oral feeding intolerance. No complications developed in any of the patients during the procedure. While 24 patients were discharged, mortality developed in 15 during hospitalization due to primary pathology.

Conclusion: Contemporarily, a key requirement for optimal treatment is adequate nutrition, and the superiority of enteral nutrition is indisputable in providing such nutrition. PEG is known to be a more efficient method in long-term nutrition when compared to other enteral feeding methods. In conclusion, PEG can be performed for relevant patients with low complication rates in general surgery endoscopy units.

Keywords: Enteral nutrition, gastrostomy, gastric feeding tubes, endoscopic surgical procedure

INTRODUCTION

Percutaneous endoscopic gastrostomy (PEG), an enteral feeding method, was first described by Gauderer et al.[1] in 1980. Now, PEG is widely acknowledged as the most efficient way to provide long-term nutritional support.[2,3] It is a safe and effective method, offering some advantages over the nasoenteral route to ensure the delivery of nutrients to the digestive system in patients with difficulty in oral consumption of food and liquids.[4]

However, enteral nutrition may not be provided efficiently in a number of conditions leading to passage problems (e.g., larynx, esophagus, and stomach cancers) or causing dysphagia (e.g., genetic diseases, cerebrovascular accident, head trauma, brain tumor, and amyotrophic lateral sclerosis). Enteral nutrition is the safest and most cost-effective method for artificial nutrition among those who cannot maintain adequate oral intake. By preventing intestinal rest, it is possible to reduce the possibility of intestinal mucosal atrophy, bacterial translocation, and disruption of the immunological barrier function of the intestinal wall.[2]

The following methods can be adopted as an enteral feeding route: nasoenteral route, PEG, percutaneous endoscopic gastro-jejunostomy, percutaneous endoscopic jejunostomy or surgical gastrostomy, and jejunostomy. If patients are to receive enteral nutrition for less than four weeks, nasoenteral nutrition is the recommended route. Yet, considering their clinical conditions, the percutaneous route should be adopted if they are to receive enteral nutrition for more than four.[5]

The present study attempted to retrospectively investigate the PEGs performed in the surgical endoscopy unit and intensive care units.

METHODS

The study was carried out with the permission of Ankara City Hospital No:1 Clinical Researches Ethics Committee (Date: 22.03.2023, Decision No: E1-23-3389). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Patients' Data

The present study retrospectively recruited 39 patients undergoing PEG in the general surgery endoscopy unit of our hospital between July 2019 and November 2020. The patients' demographic information, clinicopathological data, and laboratory findings were extracted from the hospital's electronic records.

Inclusion Criteria

According to the recommendations from "ESPEN practical guideline: Clinical nutrition in surgery 2021 (6)," those needing long-term (> 4 weeks) enteral nutrition and those 18 years and older who had PEG inserted by our unit were included in the study. The PEG procedure was performed upon written consent from the patient's first-degree relatives.

A team of experienced specialists, assistant physicians, and nurses performed the procedure at the bedside for patients intubated in the intensive care unit or with a poor general condition or in the endoscopy unit for other patients after being sedated by the anesthesiologist.

Exclusion Criteria

Patients younger than 18 years and whose records could not be accessed were excluded from the study.

PEG Technique

The abdominal wall is stained with povidone-iodine appropriately, and the area is covered with sterile drapes. The stomach is entered with a fiberoptic endoscope. The stomach and duodenum are thoroughly evaluated for local contraindications. While the patient is supine, sufficient gas insufflation is performed to provide gastric distension. Ensuring a dark environment in the operation room, the endoscope light becomes visible with transillumination on the anterior abdominal wall for safe operation. The assistant presses the transillumination area with their finger, and an indentation toward the lumen becomes visible in the stomach wall thanks to the pressure with the endoscope. The skin incision point for the PEG catheter is then determined to coincide with the distal corpus anterior wall of the stomach. The assistant injects a local anesthetic into the skin and under the skin and makes a 3-5 mm incision. Through this incision, an 18-gauge needle is passed through the subcutaneous and stomach wall and advanced to the viewing angle of the endoscope. The assistant sends the guide wire to the stomach through the needle, and it is caught with the snare sent from the endoscope and taken out of the mouth with the endoscope. The pointed end of the lubricated PEG catheter is attached to the guide wire taken out of the mouth. The assistant pulls the skin-side end of the guide wire and allows the PEG catheter to reach the stomach through the mouth and esophagus. Pulling the guide wire a little more allows the pointed end with all but the 3-4 cm part of the catheter to be eluxated out of the skin incision. Then, the stomach is reached again with the endoscope to check the entrance of the catheter into the stomach. The catheter length is adjusted, and it is fixed on the anterior abdominal wall using a plastic stopper. The stopper brings the anterior stomach wall closer to the abdominal wall, and the procedure is terminated.

The mentioned procedure was performed with a Fujinon eve E-400 fiber endoscope using the "Pull-through" technique (Gauderer Ponsky). A 20 French Abbot inverta-PEG kit was used during the procedure. Prophylaxis was applied using the first-generation cephalosporins 30 minutes before the procedure. It was ensured that drugs that may cause bleeding diathesis were discontinued, and enteral nutrition was stopped at least 6-8 hours before the procedure. For patients not developing complications during PEG placement, it was recommended to reach the target nutritional dose in correlation with the clinical nutrition unit following the restriction of catheter use for 8-12 hours.

Statistical Analysis

The patients' data were presented as frequencies and percentages (%).

RESULTS

The data of 39 patients, 17 (44%) females and 22 (56%) males, were retrospectively investigated in this study. The median age of the patients was found to be 67 years (21-102 years). While 32 patients were hospitalized in the intensive care unit, four received palliative care, and three were followed up in the clinic wards. Considering the pathologies leading to the indication of PEG catheter placement, 15 patients had Cerebrovascular disease, 12 had Alzheimer's disease, 4 had absent swallow reflex, 3 had a subarachnoid hemorrhage, 2 had a hypoxic brain, 1 had spastic cerebral palsy, 1 had Sanfilippo syndrome, and 1 had oral feeding intolerance. No complications developed in any of the patients during the procedure. While 24 patients were discharged, mortality developed in 15 during hospitalization due to primary pathology. The findings are summarized in **Table 1**.

Table 1. Patients' clinicopathological and demographic characteristics

Number of patients - n	**39**
Sex - n (%)	
Female	17 (%44)
Male	22 (%56)
Age (median)	67 years (21-102 years)
Indication - n (%)	
Cerebrovascular event	15 (38)
Alzheimer's disease	12 (31)
Swallow reflex disorder	4 (10)
Subarachnoid hemorrhage	3 (8)
Hypoxic brain	2 (5)
Spastic cerebral palsy	1 (3)
Sanfilippo syndrome	1 (3)
Oral feeding intolerance	1 (3)
Complication - n	0

DISCUSSION

Despite having regular digestive system functions, patients who need long-term enteral nutrition due to loss of swallowing function or dysphagia are mostly hospitalized in neurology clinics and intensive care units due to a number of diseases developing secondary to an acute or chronic pathology. Therefore, long-term enteral nutrition needs to be planned for such patients both during hospitalization and following discharge. Although it has been more than 40 years since its introduction, PEG continues to be a widely adopted approach in enteral nutrition and hydration.[3,7] Its simplicity was a critical factor in its eventual success and adaptation.[8] PEG is a feeding technique applied when it is thought that oral feeding disrupted for any reason will last at least four weeks.[9] It was previously shown that enteral nutrition with a PEG tube significantly improves patients' quality of life.[10,11]

Mechanical obstruction of the digestive tract (unless the procedure itself is indicated for decompression), the presence of active peritonitis, unrecoverable coagulopathy, and ongoing bowel ischemia are absolute contraindications to tube placement for nasoenteral and percutaneous enteral nutrition.[12] In addition to hemodynamic and respiratory instability specific to percutaneous enteral nutrition, recent gastrointestinal bleeding due to peptic ulcer disease is shown as a contraindication.[5]

Gastrostomy tube placement can be performed with three different techniques: endoscopic (PEG), radiological, and surgical. A recent systematic review study including 1,194 PEG cases reported the technical success rate of PEG to be 90%.[13]

The literature defines the two most commonly used techniques for PEG catheter placement as the 'push' and 'pull' techniques. Today, the best-known and most widely adopted one is the 'pull' technique.[14,15] It was discovered that the pull technique was adopted to place the tubes in the patients in this study.

Compared to nasoenteric tubes, PEG tubes result in less complications (irritation, ulceration, bleeding, esophageal reflux and aspiration pneumonia), higher subjective comfort and even higher feeding efficacy.[16-18] Serious complications (e.g., bleeding, perforation, and peritonitis) during or immediately after gastrostomy are rarely seen (1.8%).[1] Despite the restricted sample size, such serious complications did not develop in the cases in this study.

Patients with pathologies associated with swallowing disorders (e.g., motor neuron diseases and multiple sclerosis), patients with oral intake disorders due to esophageal tumors, head trauma, or stroke, and those with anorexia due to underlying conditions can be counted among the candidates to be fed through feeding tubes.[19] Dysphagic patients and patients with anorexia, malabsorption, or excessive catabolism may also need long-term enteral nutrition.[19,20] In a PEG series of 367 patients by Haggi et al.[3] the most common indication for tube placement was neurological dysphagia in 259 (70.6%) patients and cerebrovascular accident in 212 (81.9%) of them. In addition, other indications were reported to be oropharyngeal tumors (64; 17.4%), laryngeal tumors (31; 8.4%), esophageal tumors (9; 2.5%), and esophageal fistula (4; 1.1%). Overlapping the findings in the literature, the most common indications in this study were found to be cerebrovascular disease, Alzheimer's disease, swallow reflex disorder, subarachnoid hemorrhage, hypoxic brain, spastic cerebral palsy, Sanfilippo syndrome, and oral feeding intolerance.

CONCLUSION

Overall, PEG catheter placement for patients with an indication of long-term enteral nutrition and hydration can be considered the first option that can be safely performed at the bedside without complications in general surgery endoscopy units.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Ankara City Hospital No:1 Clinical Researches Ethics Committee (Date: 22.03.2023, Decision No: E1-23-3389).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

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Audio-vestibular signs in rheumatoid arthritis

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ABSTRACT

Aims: The purpose of this study is to investigate the audio vestibular signs in patients with rheumatoid arthritis (RA).

Methods: In this cross sectional comparative research, the study group included 30 RA patients and 30 control group patients who had no ear complaints. All patients had audio vestibular evaluations that include pure tone audiometry, tympanometry, acoustic reflexes, otoacoustic emissions (OAE) and vestibular evoked myogenic potential (VEMP).

Results: In RA group pure tone audiometry; air conduction at 500, 1000, 4000 Hz frequencies, bone conduction at 500, 4000 Hz frequencies were having more hearing loss than the control group. Tympanometry showed that pressure and the gradient were increased in RA group compared with control group. In acoustic reflex test; the amplitude values were less than the control group at 500, 1000, 4000 Hz frequencies in RA group's contralateral ear. When the RA group compared with control group in OAE testing, amplitude values of TEOAE was decreased in RA group at 1000, 2000 Hz frequencies, and at 1000 Hz frequency, the amplitude was decreased in DPOAE. In VEMP; N1 latency amplitude was longer than the control group and P1N1 amplitude was shorter than the control group.

Conclusion: When the systemic effects and etiopathogenesis of RA was thought; it was concluded that and audio vestibular system may be affected by this way

Keywords: audio-vestibular, rheumatoid arthritis, vestibular evoked myogenic potentials

INTRODUCTION

Rheumatoid arthritis (RA) is a connective tissue disease characterized by chronic inflammation of the synovial joints.[1] Although its etiology is not known exactly, it is a multisystemic disease, and there have been studies in recent years suggesting that it may cause hearing impairment as well as its neurological, temporomandibular, and laryngeal reflections. It is argued that autoimmunity plays a role in the etiology.[2] It is thought that the target of this autoimmunity may be type II collagen or a glycoprotein in articular cartilage.[2] In the cochlea, the basilar membrane separating the scala media and scala tympani from each other is connective tissue and is rich in glycoprotein and fibronectin.[2] The lamina spiralis also contains type II collagen, the limbal layer, and the tectorial membrane covering the spiral limbus cells, which are attached to the inner edge of the ossea.[2] It can be thought that the autoimmunity that develops against the collagen and glycoprotein structure in RA may also develop against the glycoprotein and collagen structure present in the inner ear.[2,3]

METHODS

Study Population and Design

This study was approved by the Ethics Committee of Kırıkkale University, Faculty of Medicine (Date 21.02.2011, Decision No: 2011-0021). Informed consent was obtained from all participants included in the study. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. This study is a cross-sectional comparative study. Thirty patients were included in study (6 males, 24 females)who were diagnosed as having RA after anamnesis, clinical examinations, and laboratory tests in accordance with the ARC 1987 criteria, by the Department of Physical Medicine and Rehabilitation in Kırıkkale University.[4] The control group consisted of 30 patients (16 men and 14 women) who applied to the Ear, Nose, and Throat (ENT) Department for reasons other than ear complaints. Otoscopic examination of all control group was normal.

Methods for Evaluation

Pure-tone audiometry, impedancemetric measurements (tympanometry and acoustic reflex), otoacoustic emission,

and vestibular evoked myogenic potential (VEMP) tests were applied to the patients. In pure-tone audiometry, Losses greater than 20 dB relative to the pure tone average were considered hearing loss. Patients with air and bone conduction gaps of more than 10 dB were considered to have CHL. Patients whose pure tone averages were higher than 20 dB and the air-bone gap was less than 10 dB were considered SNHL. Patients with a difference of more than 10 dB were considered to have mixed hearing loss and pure tone average (PTA) calculated by taking the average of the values obtained at 500, 1000, and 2000 Hz frequencies in the air and bone threshold. Tympanometry and stapes reflex (acoustic reflex) were measured in impedancemetry. Pressure and gradient values were measured in the obtained tympanogram curve. In acoustic reflex measurement, the stapes reflexes of the patients were measured ipsilaterally and contralaterally at frequencies of 500, 1000, 2000, and 4000 Hz, and the reflex was recorded as "yes" or "no". In the otoacoustic emission, the amplitude values obtained in the transient evoked otoacoustic emission (TEOAE) and distortion product otoacoustic emissions (DPOAE) were recorded. Afterwards, a cervical VEMP (c-VEMP) test was performed on the patients, and VEMP values (P1 latency (milliseconds, ms), N1 latency (ms), P1N1 latency (ms), and P1N1 amplitude (microvolts, V) were recorded.

Statistical Analysis

A statistical analysis was made using the SPSS 23 package statistics program. The means of the parameters that did not fit the normal distribution were compared with the Mann-Whitney-U test. The comparison of the groups was made using the chi-square test. p value below 0.05 was considered significant.

RESULTS

A total of 30 patients (7 men and 23 women) from the RA patient group were included in this study. The ages of the patients were between 20 and 70 years, and the mean age was 49.76 years. The control group of the study consisted of 14 men and 16 women, for a total of 30 patients that ages were between 36 and 65, with a mean age of 44.83 years (**Table 1**). In the RA group, CHL was detected in 8 ears (13.3%) and SNHL in 15 ears (25%). There was no mixed-type hearing loss in any of the patients, and hearing in 37 ears was evaluated as normal. SNHL was detected in 7 ears (11.6%) in the control group. The evaluated normal ears were 53. Hearing loss was more common in the RA group at 500, 1000, and 4000 Hz between the airway hearing thresholds of the control and RA groups ($p<0.05$). Hearing loss was found to be higher in the RA group for the bone conduction threshold at 500 and 4000 Hz frequencies between the bone conduction hearing thresholds in the control and RA groups ($p<0.05$). In the control and RA groups, both parameters were higher in the patient group, between pressure and gradient values. In acoustic reflex measurements no statistically significant results were found in the ipsilateral and contralateral ears between the control and RA groups ($p<0.05$). In otoacoustic emission measurement, control and RA TEOAE amplitude values at 1000–4000 Hz frequencies were found to be lower in the RA group at 1000 and 2000 Hz frequencies ($p<0.05$). In DPOAE amplitude values, the amplitude values were found to be lower in the RA group at a frequency of 1000 Hz ($p< 0.05$). P1 latency (ms), N1 latency (ms), P1N1 latency (ms), and P1N1 amplitude (mV) were evaluated in the VEMP test. Between the control and RA groups, N1 latency was found to be prolonged in the RA group compared to the control group, and the P1N1 amplitude was found to be decreased ($p< 0.05$). The results of the study are shown in **Table 2**.

Table 1. Demographic data

	Rheumatoid arthritis group n=30	Control group n=30	All n=60
Age	49.76±11.30	44.83±7.40	47.30±9.68
Gender			
Male	7 (23)	14 (47)	21 (35)
Female	23 (77)	16 (53)	39 (65)

(%) Column Percentages

Table 2. Comparison of Rheumatoid Arthritis (RA) and control group (n=60)

		Mean±sd	Min-max	P
Air Conduction Results (pure tone audiometry)				
500 Hz (dB)	Control RA	13.25±7.41 21.00±7.90	5.00-40.00 5.00-40.00	0.001
1000 Hz(dB)	Control RA	13.58±8.54 17.50±8.51	5.00-50.00 0.00-40.00	0.01
2000 Hz (dB)	Control RA	14.00±8.82 17.16±9.26	0.00-50.00 5.00-40.00	0.06
4000 Hz (dB)	Control RA	17.16±10.26 21.91±12.31	5.00-50.00 5.00-70.00	0.02
TEOAE Results				
1000 Hz (dB)	Control RA	3.53±5.20 1.34±2.97	0.00-20.50 0.00-13.90	0.005
1500 Hz (dB)	Control RA	4.65±5.25 3.98±5.71	0.00-19.20 0.00-19.60	0.51
2000 Hz (dB)	Control RA	6.84±4.63 4.26±5.29	0.00-19.40 0.00-19.60	0.004
3000 Hz (dB)	Control RA	4.46±4.25 3.81±4.82	0.00-13.30 0.00-19.40	0.43
4000 Hz (dB)	Control RA	1.83±3.75 2.59±4.27	0.00-11.60 0.00-14.90	0.3
VEMP Results				
P1 latency (ms)	Control RA	14.25±2.88 16.96±11.29	8.33-24.67 0.00-48.00	0.054
N1 latency (ms)	Control RA	20.89±4.08 23.93±14.44	12.33-40.33 0.00-55.33	0.03
P1N1 latency (ms)	Control RA	6.67±2.67 6.97±4.71	3.33-15.67 0.00-20.67	0.66
P1N1 amplitude (μV)	Control RA	6.09±2.35 4.95±3.44	2.20-12.10 0.00-13.00	0.02

TEOAE (Trans Evoked Otoacoustic Emissions), VEMP (Vestibular Evoked Myogenic Potentials)

DISCUSSION

Baradanafar et al.[5] performed PTA, tympanometry, and acoustic reflex tests in patients with RA in 2010. Significant difference were obtained at 8000 Hz in PTA. It has been suggested that the current SNHL may be an extra-articular reflection of RA and may be due to drug use or ototoxicity. It has been claimed that increased laxity in the middle ear transduction mechanism due to damage to the joint fluid between the middle ear ossicles may be a cause of CHL.[5] It has been suggested that mixed hearing loss may be related to the multifocal effect of the audiological system.[5] There are also studies where it is claimed that SNHL may be due to 8th nerve damage or vasonervosum arteritis.[6] Raut et al.[7] on the other hand, claimed that SNHL could be due to immune complex-associated vasculitis occurring in the inner ear, antibodies developing against the inner ear, neuritis, or ototoxic effects of drugs. They suggested that

CHL may be due to joint destruction between the ossicular chain. There are other studies suggesting that SNHL may be due to vasculitis or neuritis in parallel with Raut et al.[8-10] There are many studies showing that SNHL is mostly detected in RA.[5-7,9]

In the studies performed, SNHL was reported in 27–41% of patients with RA in general; CHL was detected at a rate of 17.4%.[6,7,10] In current study, hearing loss was found in approximately 50% of the cases. 13.3% of this hearing loss was evaluated as CHL and 25% as SNHL.

The involvement of middle ear ossicles in RA was first suggested by Copeman.[11] Copeman found CHL in 3 RA patients with hearing loss who had no pathological physical examination findings related to the ear. He emphasized that this situation may be related to the involvement of middle ear ossicles by RA. Heyworth et al.[10] found sensorineural hearing loss in 27% of patients with RA in their study; they could not find any evidence that RA affects the ossicular chain. Rosenberg[12] and Moffat[13] suggested that CHL is due to a decrease in thickness in the tympano-ossicular system, while Reiter[14] suggested that the rigidity of the middle ear transduction mechanism increases. In current study, the majority of cases were SNHL. From this point of view, it has been concluded that the cochlear structures are more affected than the middle ear ossicles.

Ozcan et al.[15] evaluated the tympanometry values as abnormal, although not significant. Halligan et al.[16] found no difference between the tympanometry results of the RA and control groups. Coletti et al.[17] found a relationship between abnormal resonance values in tympanometry and more aggressive RA, suggested that RA may have affected the incudostapedial and incudomalleolar joints, which are diarthrosis joints. In study, pressure and gradient values were found to be higher in the RA group. This situation may be due to the extra-articular involvement of the diarthrosis joints in the middle ear, in parallel with the comments of Ozcan et al.[15] There are studies on how much the auditory system is affected in patients with RA, but there are very few studies on how much the vestibular system is affected by these multisystemic diseases. Heydari et al.[18] performed the VEMP test in patients with RA and found the P13 latency to be higher in the patient group. No difference was found between amplitudes. Ferrara et al.[19] found vestibular dysfunction in some RA patients. Kakani et al.[20] obtained abnormal caloric test results or abnormal saccadic eye movements in patients with RA. King et al.[21] suggested that vestibular involvement in RA may cause vision loss due to vestibulo-ocular and optokinetic reflex involvement and postural instability due to vestibulospinal reflex dysfunction. In our study, N1 latency increased and P1N1 amplitude decreased in patients with RA in the c-VEMP test. This suggested an abnormality in the vestibulosaccular pathway.

Limitations of This Study

This is because it was done on a small group of patients. Our measurements reflect only a cross-section of time. This relationship could have been better studied in a cohort study with repeated measurements.

CONCLUSION

RA is a disease that still has many unknown factors in its etiopathogenesis and is thought to be caused by genetic, environmental, hereditary, and autoimmune causes.. It was concluded that the entire audiovestibular system, especially the cochlear and vestibular end organs, may be affected in RA.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Kırıkkale University, Faculty of Medicine Ethics Committee (Date 21.02.2011, Decision No: 2011-0021).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Original Article

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The efficacy of erector spinae plane block (ESPB) applied under ultrasonography guidance in percutaneous nephrolithotomy operations

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ABSTRACT

Aims: This study aimed to evaluate the effect of erector spinae block (ESPB) applied preoperatively under ultrasonography guidance in percutaneous nephrolithotomy (PNL) operations in terms of the intraoperative need for opioids, postoperative analgesia, and patient satisfaction.

Methods: Of 60 patients who were 18 to 65-year-old and evaluated as American Society of Anesthesiologists (ASA) risk I-II-III were planned to undergo elective PNL. The patients were randomly separated into two groups as the Block group-administered ESPB under sedation in the preoperative period and the Control group-administered no ESPB. All the operations were performed under general anesthesia. The study data were analyzed using Mann-Whitney U-test and the Independent Samples t-test.

Results: Demographic data of the patients were not different between the groups ($p>0.05$). Neither intraoperative opioids nor analgesics were required for any of the patients in the ESPB group whereas intraoperative opioids and analgesic drugs had to be administered to all of the patients in the control group ($p<0.001$). The postoperative patient satisfaction scores in the ESPB group were found statistically higher than that of the control group ($p<0.001$).

Conclusion: The results demonstrated that ESPB applied preoperatively under USG guidance reduced the need for intraoperative opioids and postoperative analgesia in PNL operations. This, in turn, increased patient satisfaction by maintaining patient comfort after surgery.

Keywords: Erector spinae plane block, percutaneous nephrolithotomy, preemptive analgesia, ultrasonography

INTRODUCTION

In 2016, Forero et al.[1] described erector spinae block (ESPB) to provide a strong postoperative pain elimination following thoracic and abdominal surgery. ESPB is applied by injecting local anesthetic solution between the erector spinal muscles (iliocostalis, longissimus, spinalis) and the transverse process under ultrasonography (USG) guidance.[2] The analgesic effect is formed by local anesthetic spreading to the paravertebral area affecting the dorsal and ventral branches of the thoracic spinal nerves and with the effect on the sympathetic ganglia of the thoracic spinal nerves, and this provides multi-dermatomal sensory block.[1]

In the percutaneous nephrolithotomy (PNL) that has been commonly used in open surgery in the treatment of kidney stones, the postoperative pain is severe, and to be able to control this pain in the postoperative period, intravenous opioids and local anesthetic infiltration are often used.[3-5] Although regional analgesia methods such as paravertebral block and intercostal block have also been used, the efficacy of these on postoperative pain has still not been fully determined in PNL surgery.[3,6,7]

This study aimed to evaluate the effect on the need for intraoperative opioids, the efficacy of postoperative analgesia, and patient satisfaction of ESPB applied preoperatively under USG guidance in PNL operations.

METHODS

The study was carried out with the permission of Kırıkkale University Clinical Researches Ethics Committee (Date 28.05.2019, Decision No: 11/03). All procedures were carried

out in accordance with the ethical rules and the principles of the Declaration of Helsinki. The study was conducted in the Anesthesiology and Reanimation Clinic between June 2019 and December 2019.

Patients

A total of 60 patients were included in the study, aged 18-65 years, who were planned to undergo elective PNL in the Urology Clinic and were classified preoperatively as American Society of Anesthesiologists (ASA) risk I, II, III. All the patients provided informed consent.

Patients were excluded from the study if they had coagulopathy, any psychiatric disease, a history of allergy to local anesthetics, the presence of local infection in the area where the injection was to be applied, any spinal/paravertebral deformity, a history of pneumothorax, severe aortic stenosis, morbid obesity (BMI >40 kg/m²), or if they did not wish to participate in the study.

The patients were randomly separated into 2 groups using the sealed envelope method;

- Control Group (consisted of the patients who were applied general anesthesia only, n=30)
- BLOCK Group (consisted of the patients who were applied general anesthesia and preoperative ESPB, n=30).

General Anesthesia Protocol

All the operations were performed under general anesthesia. For the patients in the block group, ESPB was applied in the block room under standard ASA monitoring (ECG, non-invasive blood pressure, SpO_2) and sedation before entering the operation room. Patients admitted to the operating room were administered intravenous (iv) sedation of 0.03-0.05 mg/kg midazolam (Sedozolam®, Monemfarma, Ankara, Turkey) through a venous cannulation opened under standard ASA monitorisation. All patients in both groups were administered 1g iv paracetamol (Partemol®, Vem, İstanbul, Turkey) before anesthesia induction. Induction was applied with 2-3 mg/kg iv propofol (Propofol®, Fresenius, Kabi, Melsungen, Germany), 1 mcg/kg iv fentanyl (Fentanyl Citrate®, Hospira, USA) and 0.6 mg/kg iv rocuronium (Esmeron®, Organon, Kloosterstraat, Holland). Anesthesia maintenance was provided with 2% sevoflurane (Sevorane®, Abbott, Chicago, USA), with 50% O_2 and 50% air.

ESPB under Ultrasonography Guidance

Standard ASA motorization was applied to the patients in the block room before the operation. Sedation was provided with 0.03-0.05 mg/kg iv midazolam. The ESPB procedure was applied under USG guidance to the side to be operated on. The patients were then transferred to the operating room. In the application of ESPB, the patient was positioned sitting, and after providing sterility, a linear 10-18 MHz USG probe (Esaote MyLab 30, Geneva, Italy) was placed between the two transverse processes in the paramedian plane. The transverse processes and pleura were visualized at the T7 level. Anesthesia of the skin and subcutaneous tissue was provided with 2% lidocaine (Aritmal®, Osel, İstanbul, Turkey). An 18 Gauge 50 mm needle (Pajunk, Geisingen, Almanya) was advanced in-plane until it touched the transverse process. When the tip of the needle was between the erector spinae muscles and the transverse process, aspiration was applied then 20 ml 0.5% bupivacaine was injected (Buvasinn ®, Vem, İstanbul, Turkey). Dissemination of the local anesthetic cephalad and caudally was observed with USG (**Figures 1** and **2**). ESPB Block applications were performed by the same person in all patients.

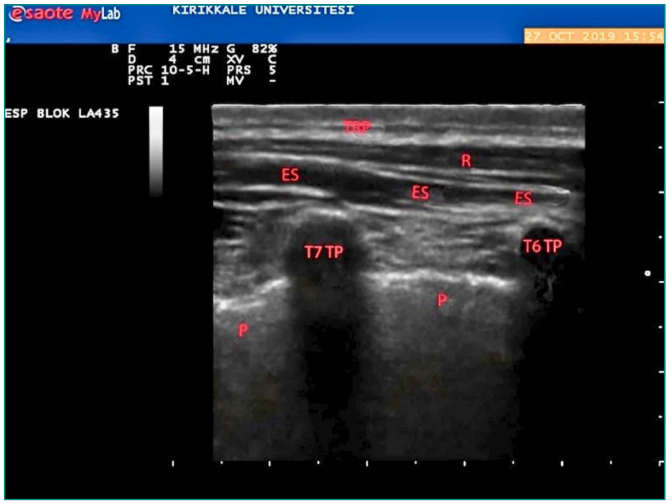


Figure 1. ESPB USG image (TRP: Trapezius muscle, R: Rhomboid Major muscle, ES: Erector Spinae muscle, TP: Transverse Process, P: Pleura)

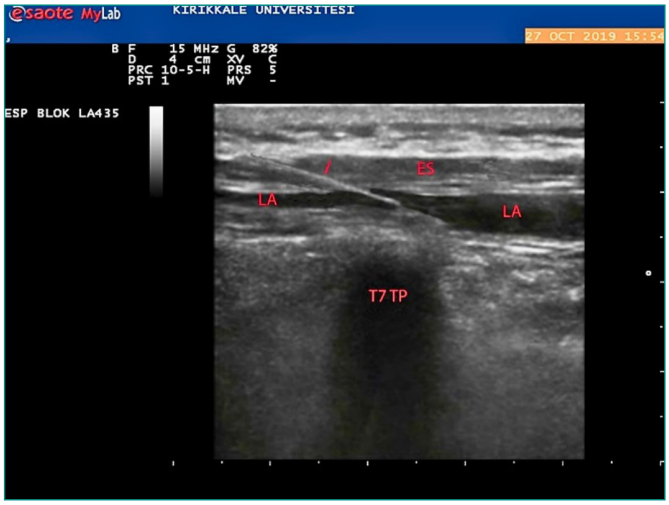


Figure 2. The spread of ESPB local anesthetic (ES: Erector Spinae muscle, TP: Transverse Process, I: Block Needle, LA: Local anesthetic)

Surgical Procedure

Before the operation was started all patients were placed in the lithotomy position and a 5 Fr ureter catheter was advanced to the ureter with a 19Fr cystoscope, then a Foley catheter was placed. The patients administered with general anesthesia were then positioned prone. After administration of the opaque substance from the access ureter catheter to the targeted calyx, a guidewire was advanced to the renal collecting system or ureter with an 18-gauge percutaneous entry needle under C-arm fluoroscopy guidance. After the access cutaneous road was dilated with the aid of Amplatz dilators (Cook Medical, Bloomington, IN, USA) up to 12Fr over the guidewire. Then, the nephrostomy balloon dilation catheter (Plasti-med, İstanbul, Turkey) was inflated up to 14-atmosphere pressure, and an access sheath (30 Fr) was placed over it.

Entering the renal collecting system with a 26 Fr nephroscope (Storz, Tuttlingen, Germany), stones were fragmented with a pneumatic or laser lithotriptor and extracted using a grasper and aspirator. After completion of the operation, a 14Fr nephrostomy tube was placed within the access sheath, and after checking with fluoroscopy, the operation was terminated.

Intraoperative Pain Management

In the intraoperative period, when there was an increase of 20% in pulse rate or blood pressure compared to baseline, a remifentanil (Rentanil ®, Vem, İstanbul, Turkey) infusion of 0.5-20 mcg/kg/min was started. A record was made for each patient of the intraoperative requirement for opioids. Towards the end of the operation, all the patients were administered 8mg iv ondansetron (Zofran®, Glaxo Smith Kline S.p.A, Italy). For neuromuscular reversal at the end of the surgery, 0.04 mg/kg neostigmine (Neostigmine®, Adeka, Samsun, Turkey) and 0.015 mg/kg atropine (Atropine sulfate®, Biofarma, İstanbul, Turkey) were administered iv. When sufficient muscle strength was achieved, patients were extubated. Cases taken to the postoperative recovery room were then transferred to the Urology ward.

Postoperative Pain Management

The severity of postoperative pain was evaluated with a Visual Analog Scale (VAS) at 0, 1, 2, 6, 12, and 24 hours postoperatively. Any complications in the first 24 hours were recorded. Patients with a VAS score of >4 were administered iv 50 mg dexketoprofen trometamol (Arveles®, Ufsa, İstanbul, Turkey) and for those with VAS >6, iv 1mg/kg tramadol (Tramosel®, Haver, İstanbul, Turkey) was administered. The requirement for postoperative additional analgesia was recorded.

Visual Analog Scale (VAS)

This 10cm scale is used to evaluate the severity of pain, with the lowest point of 0 indicating no pain and the highest points of 10, intolerable pain.

Patient Satisfaction Scale

Postoperatively, a patient satisfaction scale was applied to evaluate the satisfaction of patients in respect of pain management. The scale was evaluated as 5 points (5: very satisfied, 4: satisfied, 3: not sure, 2: not satisfied, 1: not satisfied at all) and the level of patient satisfaction was considered high when the score was high.

VAS score inquiries and satisfaction inquiries were done by a blinded observer independent of the study.

Sample Size, Power Analysis and Statistical Analysis

The sample size was calculated using G*Power© software version 3.1.9.4 (Institute of Experimental Psychology, Heinrich Heine University, Dusseldorf, Germany). Depending on the results of previous research with two tails, Type-I error 0.05 and power of 80%, effect size (d) factor 0.875, N2/N1= 1 should involve at least 44 patients.

The post hoc power was calculated using G*Power© software version 3.1.9.4 (Institute of Experimental Psychology, Heinrich Heine University, Dusseldorf, Germany). Depending on the results of the research two tails, Type-I error 0.05 and effect size (d) factor 2.758, post hoc power calculated as 99.99%.

Data obtained in the study were analyzed statistically using SPSS vn. 21.0 software. Demographic and laboratory test data were calculated as median ± standard deviation, minimum and maximum values, number (N), and percentage (%). In the evaluation of the differences in non-parametric data, the Mann-Whitney U test was used ($p<0.05$). Parametric data were analyzed with the Independent Samples t-test. A value of $p<0.05$ was accepted as statistically significant.

RESULTS

The data of a total of 60 patients who underwent PNL between June 2019 and December 2019,

were analyzed. We used CONSORT flow diagram for our study (**Figure 3**).

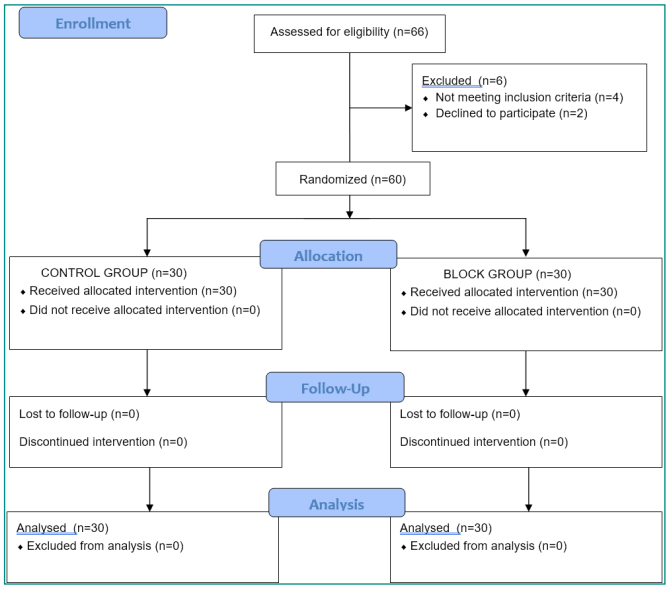
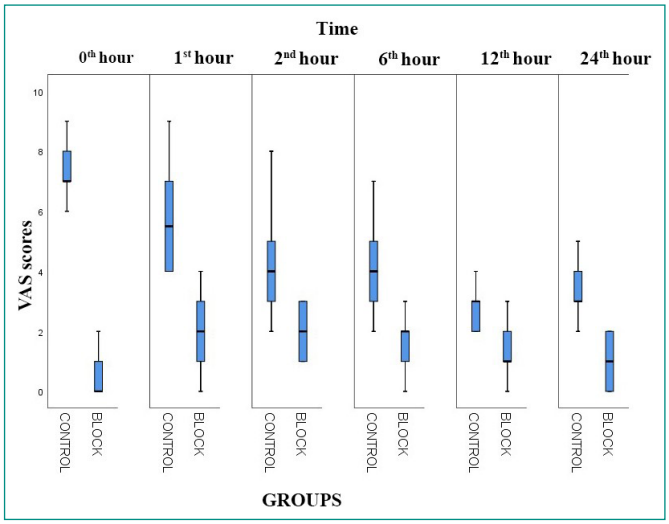


Figure 3. Flowchart of the patients

The demographic data consisted of the age, sex, body height, body weight, body mass index (BMI), and ASA scores were not different between the groups ($p>0.05$). However, the intraoperative need for opioids, postoperative VAS scores at 0, 1, 2, 6, 12, and 24 hours, the need for postoperative analgesia, and patient satisfaction scores were statistically significant between groups. Neither intraoperative opioids nor analgesics were required for any of the patients in the ESPB group whereas intraoperative opioids and analgesic drugs had to be administered to all of the patients in the control group ($p<0.001$). The postoperative patient satisfaction scores in the ESPB group were found statistically higher than that of the control group ($p<0.001$). No statistically significant difference was found between the groups in respect of the operation time and length of stay in the hospital ($p>0.05$) (**Table 1**). The distribution of the postoperative VAS scores of the groups is shown in **Graph 1** and **Table 2**.



Graph 1. Postop VAS scores of the groups at 0, 1, 2, 6, 12, and 24 hours

Table 1. Comparisons of the demographic and clinical data of the groups

Variable	CONTROL Mean ± SD/ Median (min-max)/ N (%)	BLOCK Mean ± SD/ Median (min-max)/ N (%)	p
Age (years)	49.50 (18-65)	43.50 (22-65)	0.953†
Gender			
Female	9 (30.00%)	14 (46.70%)	0.188‡
Male	21 (70.00%)	16 (53.30%)	
Height (m)	1.70 ± 0.10	1.68 ± 0.10	0.236*
Weight (kg)	80.07 ± 14.59	81.23 ± 16.60	0.444*
Body mass index	27.74 ± 5.12	28.61 ± 5.44	0.777*
ASA	2 (1-3)	2 (1-3)	0.132†
Opioid requirement			<0.001‡
Yes	30 (100%)	-	
No	-	30 (100%)	
VAS time (hour)			
0	7 (4-9)	0 (0-3)	<0.001†
1	5.50 (4-9)	2 (0-4)	<0.001†
2	4 (2-8)	2 (1-3)	<0.001†
6	4 (2-7)	2 (0-3)	<0.001†
12	5 (2-8)	1 (0-3)	<0.001†
24	3 (1-5)	1 (0-2)	<0.001†
Additional analgesia			<0.001‡
Yes	30 (100%)	-	
No	-	30 (100%)	
Operation time (minutes)	116.90 ± 33.24	127.73 ± 29.42	0.545*
Length of stay in hospital (days)	3 (2-5)	3 (2-9)	0.444†
Patient satisfaction score	3 (2-5)	5 (4-5)	<0.001†

(*) independent samples t-test; (†) Mann-Whitney U test; (‡) Pearson's chi-square test, p<0.05 (SD: standard deviation, min: minimum, max: maximum, N: number of patients, VAS: visual analog scale, ASA: American Society of Anesthesiologists)

Table 2. Distribution of the VAS scores of the groups

Group	Score	Measurement time of the VAS (hour) VAS 0 N (%)	VAS 1 N (%)	VAS 2 N (%)	VAS 6 N (%)	VAS 12 N (%)	VAS 24 N (%)
CONTROL	0	-	-	-	-	-	-
	1	-	-	-	-	-	1 (3.3%)
	2	-	-	3 (10%)	5 (16.7%)	1 (3.3%)	2 (6.7%)
	3	-	-	9 (30%)	5 (16.7%)	-	14 (46.7%)
	4	2 (6.7%)	8 (26.7%)	7 (23.3%)	12 (40%)	11 (36.7%)	10 (33.3%)
	5	1 (3.3%)	7 (23.3%)	4 (13.3%)	3 (10%)	12 (40%)	3 (10%)
	6	4 (13.3%)	6 (20%)	3 (10%)	2 (6.7%)	2 (6.7%)	-
	7	12 (40%)	5 (16.7%)	3 (10%)	3 (10%)	2 (6.7%)	-
	8	10 (33.3)	2 (6.7%)	1 (3.3%)	-	2 (6.7%)	-
	9	1 (3.3%)	2 (6.7%)	-	-	-	-
BLOCK	0	18 (60%)	3 (10%)	-	1 (3.3%)	4 (13.3%)	9 (30%)
	1	6 (20%)	10 (33.3%)	9 (30%)	9 (30%)	12 (40%)	11 (36.7%)
	2	4 (13.3%)	8 (26.7%)	11 (36.7%)	13 (43.3%)	11 (36.7%)	10 (33.3%)
	3	2 (6.7%)	8 (26.7%)	10 (33.3%)	7 (23.3%)	3 (10%)	-
	4	-	1 (3.3%)	-	-	-	-
	5	-	-	-	-	-	-
	6	-	-	-	-	-	-
	7	-	-	-	-	-	-
	8	-	-	-	-	-	-
	9	-	-	-	-	-	-

(N: number of the patients, VAS: Visual Analog Scale)

DISCUSSION

The present study results showed that the preoperative application of ESPB could reduce the intraoperative requirement of opioids. Indeed, In the control group, the postoperative VAS score at 0 hours was at least 4 (4-9), whereas, in 60% of the patients in the ESPB group, this value was 0. The postoperative VAS scores at 0 hours were ranged from 4 to 9 in the control group. However, the maximum score was 3 in the BLOCK group. These results showed that ESPB could provide a high level of analgesic efficacy postoperatively, and therefore the patients were extremely comfortable and patient satisfaction was at high levels.

Pre-emptive analgesia provides analgesia before noxious stimulation, and therefore sensitivity to painful stimuli is decreased without the development of central sensitization. It has been reported that pre-emptive analgesia is the most effective method in reducing postoperative analgesic consumption and postoperative pain.[8,9] Postoperative pain is an acute pain activated by the stress response to trauma. It also increases pulmonary, cardiac, and gastrointestinal complications and lays the ground for hypercoagulability. The generally accepted view on postoperative pain is that the pathogenesis is multifactorial. Therefore, it must be eliminated with multimodal analgesia approaches.[10] Opioids administered in the treatment of postoperative pain have nowadays been replaced by pre-emptive analgesia included in multimodal analgesia techniques. Aydin et al.[11] reported that pre-emptive analgesia significantly reduced intraoperative opioid use in patients who were to undergo laparoscopic cholecystectomy. This benefit of pre-emptive analgesia was seen with ESPB applied before general anesthesia in the present study as there was no requirement for intraoperative opioids by any of the patients in the BLOCK group. It was also thought that this brought about a significant decrease in VAS values postoperatively.

To obtain sufficient analgesia for PNL, there must be blockage of both the somatic and visceral nerves that innervate the skin, muscles, kidneys, and ureter. Pain in the kidneys is carried by the T10-L1 nerves and pain in the ureter by T10-L2 nerves. Based on this anatomic knowledge, it is thought that nerve blockage between T10 and L2 provides sufficient analgesia during PNL.[7,12] The accepted view of the effect mechanism of ESPB is that local anesthesia spreads to the epidural and paravertebral areas and blocks the dorsal and ventral branches of the spinal nerves in those regions. Thus, somatic and visceral analgesia is obtained with ESPB.[13] In the current study, both somatic and visceral analgesia was obtained with ESPB between T5 and L1.

The use of USG has become routine for regional anesthesia and nerve block. The most important advantage of the use of USG in regional blocks is that the local anesthetic dose and complications are reduced. That the correct needle position can be determined and the dissemination of local anesthetic can be observed in real-time are also extremely important advantages of regional anesthesia under USG guidance.[11] In literature, ESPB has been attempted in-plane and out-of-plane in parasagittal and transverse planes. In several published studies, in-plane in the parasagittal plane has been

applied. When a block is applied in the parasagittal plane, the spread of the local anesthesia caudally and cephalad can be more clearly seen. The risk of pleural punction and excessively deep injection with the risk of entering the neural foramen is lower in the in-plane approach than in the out-of-plane technique.[13] In the current study, ESPB was applied in-plane in the parasagittal plane. This application of ESPB under USG guidance allowed the simultaneous observation of local anesthesia dissemination between T5 and L1. At the same time, with correct needle positioning and an anatomic view, complications can be prevented.

In the results of the current study, there was no significant difference between the groups in respect of age, gender, BMI, ASA, and operating time. This showed the homogeneity of the two groups. It is also important that several factors which could affect pre-emptive analgesia were standardized, and this increased the reliability of the study.

In the literature, in a randomized, controlled study by Gultekin et al.[6] conducted between January 2017 and March 2019, 60 patients who were to undergo PNL operation were randomly assigned to one of two groups; one group was applied with ESPB at T8 level using 20 cc 0.5% bupivacaine, and the other group was not applied with a block. It was planned to administer iv tramadol and paracetamol as rescue analgesia in the postoperative period. The results of the study showed that the VAS scores at 0, 1, 6, and 24 hours and the amount of rescue analgesia used were significantly lower in the block group than in the group without block. In another randomized controlled study in literature, Ibrahim et al.[7] evaluated 58 patients between September 2017 and September 2018. The patients were separated into two groups; one group was applied with ESPB at T11 level in the prone position using 30 cc 0.25% bupivacaine, and the other group was administered 30 cc saline at the same level. When there was an increase of 20% in the basal pulse rate or blood pressure, an intravenous bolus of 0.5 mcg/kg fentanyl was administered. Patient-controlled analgesia (PCA) containing morphine was prepared for patients in the postoperative period. The study results showed that the VAS values at 2 and 6 hours postoperatively, the amount of intraoperative fentanyl used, and the amount of morphine use in the first 24 hours were statistically significantly lower in the block group than in the control group, and the time to the first use of the PCA was statistically significantly longer in the block group.

Several studies have shown that the effect of ESPB has a rapid onset and effective analgesia is provided for up to 24 hours postoperatively.[14-17] In the current study, none of the patients in the BLOCK group required intraoperative opioids, which showed the rapid onset of the effect of the block. When the VAS scores were examined at postoperative 0 hours, the highest value in the block group was 3 while the lowest value in the control group was 4. This demonstrates that ESPB applied pre-emptively provided pain-free awakening at the end of surgery. In the follow-up data, all the VAS values in the first 24 hours postoperatively were significantly lower in the BLOCK group than in the control group, which can be considered evidence that the ESPB provided effective analgesia for 24 hours.

Several studies have stated the importance of patient satisfaction in the process of eliminating postoperative pain.[18] In the current study, patient satisfaction was also considered to be of great importance in this process. A statistically significantly higher level of patient satisfaction was recorded for the BLOCK group than for the control group. The main reason for this can be considered to be that in addition to the pre-emptive application of ESPB providing good analgesia, by reducing the need for opioids in the intraoperative and postoperative periods there could also be a reduction in side-effects associated with opioids.

Study Limitations

This study had some limitations. First, as patient-controlled analgesia (PCA) devices could not be available in the clinic, the analgesia had to be provided using the single-injection method. Second, because of the study methodology, the VAS values were only examined in the first 24 hours and therefore long-term pain follow-up results of the patients could not be evaluated in this study.

CONCLUSION

As a result, this study demonstrated that ESPB applied pre-emptively under USG guidance to patients who were to undergo PNL could reduce the intraoperative need for analgesia. Due to the postoperative analgesic efficacy of the ESPB, the VAS scores were seen to be significantly reduced. This was observed to have positively affected both patient comfort and patient satisfaction. With these results, it was thought that the preoperative application of ESPB can be an effective method to provide postoperative analgesia and increase patient satisfaction in PNL operations.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Kırıkkale University Clinical Researches Ethics Committee (Date 28.05.2019, Decision No: 11/03).

Informed Consent: All patients signed the free and informed consent form.

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Current diagnosis and treatment in central serous chorioretinopathy

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ABSTRACT

Central serous chorioretinopathy (CSCR) diagnosis and follow-up are performed with multimodal imaging methods. Fundus fluorescein angiography, optical coherence tomography (OCT), fundus autofluorescence, and indocyanine green angiography can be used in the diagnosis of patients with CSCR. OCT stands out as the gold standard for imaging, diagnosis, and follow-up. Although there is no gold standard method in treatment.

Keywords: Central serous chorioretinopathy, diagnosis, multimodal imaging, treatment modalities

INTRODUCTION

Central serous chorioretinopathy (CSCR) is a clinical condition characterized by idiopathic, well-demarcated serous detachment of the neurosensorial retina (NSR). Although serous detachment in CSCR occurs as a result of impaired barrier and pump functions of the retinal pigment epithelium (RPE), the main pathology is in the choriocapillaris.

CSCR is recognized as a pachychoroid spectrum disease. Pachychoroid spectrum diseases include focal or diffuse choroidal thickening. Thinning of the choriocapillaris and thickening of the outer choroidal layers are observed. Because of choroidal hyperpermeability, subretinal fluid can often accompany diseases in this spectrum. In addition to CSCR, pachychoroid pigment epitheliopathy, pachychoroid neovasculopathy, polypoidal choroidal vasculopathy/aneurysmal type 1 neovascularization, peripapillary pachychoroid syndrome, and focal choroidal excavation are among the diseases included in this spectrum.

CSCR can be multifocal, often involving both eyes asymmetrically. In some patients, CSCR extends to the peripheral retina, while in others it may even present as subtotal bullous retinal detachment. Thinning of the foveal contour, cystoid degeneration, and damage to the photoreceptor layer cause loss of visual function.

Although 90% of the subretinal fluid is resorbed spontaneously in 3-4 months in CSCR, the improvement in visual function may take up to 1 year. Mild to moderate metamorphopsia, indistinct scotomas, decreased contrast sensitivity and impaired color vision are among the frequently ongoing complaints.

CSCR is a clinical diagnosis. In the differential diagnosis of CSCR, polypoidal choroidal vasculopathy (PCV), CNV (mostly Type 1), cavitary optic disc anomalies (if with serous detachment), choroidal hemangioma (if with focal choroidal thickness increase and serous detachment), dome-shaped macula (anterior protrusion of the macula with concomitant posterior staphyloma – often punctuated pooling on fluorescein angiography and increased subfoveal choroidal thickness) and Best disease (if there are splits in the RPE and elevation in the RPE) comes first.

While there is no need to request additional examination in patients with CSCR with demographic characteristics such as type A personality, age, and gender; advanced techniques such as fundus fluorescein angiography (FFA), optical coherence tomography (OCT), fundus autofluorescence (FAF), indocyanine green angiography (ICGA) can be used to support the diagnosis in patients with more severe CSCR.

IMAGING

Today, CSCR diagnosis and follow-up are performed with multimodal imaging methods. Because it is a fast and practical imaging method, OCT has often been the first imaging method. FAF is very useful for viewing RPE alterations. FFA indicates whether there is a leak or not. All imaging methods have different advantages. Therefore, multimodal imaging is important for CSCR.

FFA

The most important and most common finding in FFA is the 'expanding point' under serous retinal detachment. RPE leak occurs in 95% of CSCR cases. This leak point is 90% away from the fovea and is most common in the superonasal quadrant. In chronic CSCR cases, there is more than one

RPE leakage point.[1] Other most important characteristic FFA findings identified for CSCR are smokestack (the most classic), inkblot, and mushroom patterns.[2,3]

OCT

The most important advantage of OCT as an imaging method is that it is non-invasive and fast. Recently, as a result of increasing the depth of imaging with OCT with EDI (enhanced depth imaging)-OCT and SS (swept source)-OCT, imaging of choroidal vessels and choroidal thickness can be performed. As choroidal changes, thickened subfoveal choroid, dilated choroidal vessels, thinned inner choroidal layer or focal choroidal excavation can be seen in CSCR.[4,5] Choroidal thickness increased in both the affected eye and fellow eye.[4] This increase in choroidal thickness strengthens the hypothesis that the increased hydrostatic pressure originates from the choroid.[6] Choroidal thickness is affected by axial length and age. Choroidal thickness values above 395 micrometers are called the thick choroid (pachychoroid).[7] Choroidal thickening results from focal or diffuse dilatation of choroidal vessels. On OCT imaging, PED, microchips, fissures, hypertrophy, or atrophy can be detected in RPE.[4,8,9] RPE elevation occurs in the area of dilated vessels. RPE protrusion, PED, subretinal fibrinous exudate, dipping in the outer retinal layer, and elongation in the photoreceptor outer layers may occur at the leakage site.[10,11] The area where the tiny RPE defect is seen on the OCT matches the leakage point in the FFA.[12] The elongation in the outer layers of the photoreceptor initially causes hypo-autofluorescence by suppressing the RPE, and then, with the development of atrophy (window defect), it leads to a hyper-autofluorescence image. PED appearance in OCT can be in different shapes such as dome-shaped, double dome-shaped, flat, protruding or ruptured. Intraretinal hyperreflective deposits, distortion in the ellipsoid zone, decrease in foveal thickness and cystoid macular degeneration are other findings.[13-15] Focal choroidal excavation, PED, and RPE atrophy are more common in chronic CSCR.[4,5,9] The amount of subretinal hyperreflective deposit increases with the duration of symptoms and is associated with a lower final BCVA.[16] These deposits may also appear in the subretinal, intraretinal, or inner choroid.

FAF

On FAF imaging, dot-like precipitates in the outer retinal layers and subretinal yellow material are seen in CSCR.[17] FAF is an imaging technique that is very useful in distinguishing acute, chronic, and recurrent cases. In acute CSCR, there is hyper-fluorescence in the detached NSR area. In chronic CSCR cases, both hyper- and hypo-fluorescent areas are seen. Areas with decreased autofluorescence do not benefit from laser treatment.[18]

Today, the use of FAF together with OCT is frequently preferred in clinics for the diagnosis and follow-up of CSCR.

ICGA

One of the best ways to show problems with choroidal circulation is with ICGA. Vascular abnormalities in the choroidal layer can be seen with ICGA. A delay in the filling is observed in ICGA in CSCR eyes.[19] ICGA leaks from dilated choroidal vessels (congested veins).[4] In the early phase ICGA, hypo-fluorescence is observed due to the decrease in the filling in the choriocapillaris. In mid-phase ICGA, dilated large choroidal veins are observed. This image is due to an atrophic RPE or PED. Atrophic areas are observed as a faintly hyperfluorescent focus due to increased permeability in choroidal vessels. In the late phase, previously hyperfluorescent areas may become permanent hyperfluorescent spots or these areas may be surrounded and covered by a central displacement of another hyperfluorescent focus. There is thinning and atrophy of the choriocapillaris due to the compression effect of the dilated choroidal vessels.[4] Hyperfluorescent areas on ICGA have non-perfused choriocapillaris.[20] Laser Doppler flowmetry has also shown that the blood flow in the choriocapillaris is slow.[21]

CURRENT TREATMENTS

In the treatment, the presence of risk factors that may cause CSCR should be evaluated first. Risk factors should be eliminated if possible. With the discontinuation of a used steroid, CSCR regresses by 90%.[22] In the absence of risk factors that can be intervened or eliminated, the first step in the treatment of acute CSCR is follow-up because it resolves within 3-4 months.[23] There is no consensus on when to start treating a CSCR attack. Treatment is initiated in cases of persistent macular NSR detachment, which usually lasts longer than 4 months, severely reduced visual acuity, recurrence, CSCR attack causing low final BCVA in the fellow eye, and in cases where the patient is from the occupational group that needs rapid improvement of vision.[24]

Focal Laser Photocoagulation

Laser applications at green (514 nm) and yellow (580 nm) wavelengths close the leakage point. This closure effect is provided by the induction of RPE cells and fluid efflux, as well as thermal damage.[25,26] The effect of photocoagulation is at the RPE level and has no effect on the choroid.[27] After the damage created on the RPE, the surrounding RPE cells also undertake the task in that region.[28] Laser photocoagulation therapy does not contribute to the final BCVA and may rarely cause paracentral scotoma and iatrogenic CNV.[29] Therefore, it should be preferred in extrafoveal leaks.[30] While there are studies indicating that laser photocoagulation has no effect on recurrences,[29] there are studies showing that it reduces recurrences.[31] According to the previous study, the recovery period is shortened by 2 months with photocoagulation.[31]

If the leakage point is detected, laser photocoagulation still appears to be a good treatment alternative in cases 500 microns away from the fovea and lasting longer than 4 months.

Photodynamic Therapy

Verteporfin (Visudyne, Novartis, Switzerland) is an agent that causes vessel occlusion by causing endothelial vascular damage. With the stimulation of light with a wavelength of 693 nm and oxygen, free radicals are formed in the vascular network and cause vascular damage. With this mechanism, hyperpermeable vessels in the choriocapillaris are taken under control.[32] In the follow-ups, it was observed that there was a decrease in vascular permeability and even a decrease in choroidal thickness.[33,34] In the Photodynamic Therapy (PDT) protocol applied for CSCR, application with 25 J/cm² (lower fluence, ½ fluence) setting is preferred.[35] Low fluence application causes fewer side effects with a good effect in CSCR treatment.[35] Half-dose PDT (3 mg/m²) can also be preferred to reduce side effects with a good effect.[33] 1/3-dose

PDT application is not as effective as half-dose PDT.[36] There is no definitive data on whether half-dose PDT or half-fluence PDT is superior. No long-term studies are showing the results and safety of PDT.

PDT results in a reduction in serous NSR detachment and symptoms, and an increase in BCVA.[37] Success is achieved when PDT is performed after the determination of the hyperfluorescent point after ICGA.[38,39] PDT performed without showing the presence of hyperfluorescent spots with ICG does not have much benefit.[39] Complications such as a change in RPE, choriocapillaris hypoperfusion, and development of CNV may occur as a result of PDT.[39]

Although there is a rapid regression in serous NSR detachment with low-fluence PDT at 3-month follow-up comparing PDT to focal laser photocoagulation, there is no difference in anatomical and functional success in the end.[40]

Micropulse (Subliminal) Laser Photocoagulation

Subthreshold micropulse laser is also used in the treatment of CSCR.[41] Induction of RPE cells is provided by giving short-term multiple pulses to the RPE cells. Higher wavelengths have a better effect on the choroid and do not damage the inner retinal layers.[42] In some studies, subthreshold diode micropulse laser has been shown to give better results than green argon laser (faster recovery and better contrast sensitivity).

The micropulse diode laser provides an effect like PDT, but it acts more slowly.[43,44] Iatrogenic side effects are very rare.[43,44] However, there is no data on how long the treatment should continue.

Sub-Threshold Non-Damaging Retinal Laser Photocoagulation

The non-damaging retinal laser therapy (NRT) was recently defined. The non-damaging hyperthermia was demonstrated in mice by observing the expression of heat shock protein. Based on those reported results; the titration protocol has been developed by adjusting laser power and duration.[45] This protocol is called Endpoint Management (EpM) and is related to the minimal tissue effects in visible titration. The EpM laser therapy uses an Arrhenius integral algorithm to control laser power and pulse duration, optimizing the therapeutic effect of the laser at sub-visible levels. The laser power is titrated to create a barely visible lesion at a pulse duration of 15 or 20 milliseconds, and EpM using 15 milliseconds is called NRT.

İlhan et al.[46] treated 23 eyes of 23 treatment-naïve chronic CSCR patients with NRT. The irradiation of 577 nm yellow light was conducted on the serous detachment area after switching over to the NRT algorithm. At the 2nd-month follow-up visit after NRT, complete resorption of subretinal fluid was observed in 78.3% of eyes and incomplete resorption in 21.7% of eyes.[46] Worse values of BCVA and CMT before NRT were found to have an increased risk for incomplete resorption.[46] They concluded that significant functional and anatomical improvements can be observed in the early period after NRT in patients with chronic CSCR.[46] They emphasized that patients having worse baseline BCVA and CMT have an increased risk for incomplete resorption.[46]

Selective Retinal Therapy

It acts only on intracellular melanosomes in RPE cells.[47] Since NSR is not affected, it does not cause scotoma. It has been observed to be successful in the treatment of juxta foveal lesions.[47,48]

Anti-VEGF

Anti-VEGF therapy has a reducing effect on choroidal permeability.[49] However, there is no increased VEGF level in CSCR.[50] Therefore, anti-VEGF should be used only in cases where CSCR is associated with CNV. With the use of bevacizumab as an anti-VEGF agent, visual acuity increases, leakage decreases, and the amount of subretinal fluid decreases.[51] However, the superiority of bevacizumab treatment over other treatment methods has not been demonstrated.[49] The benefit of anti-VEGF therapy is evident in cases where CSCR is associated with CNV.[52] While similar benefits are seen in the treatment of chronic CSCR, cases unresponsive to treatment have also been observed.[53] Some studies stated that anti-VEGF injection did not change the outcome of BCVA in acute CSCR.[54] Subretinal deposits are thought to be the reason for this unresponsiveness, preventing the reabsorption of fluid.[55]

Mineralocorticoid Receptor Antagonist

Aldosterone and cortisol bind to mineralocorticoid receptors (MR). MR blockade is beneficial in the treatment of endothelial dysfunction, atherosclerosis, hypertension, heart failure, and chronic renal failure. In the treatment of retinopathy of prematurity, MR antagonists have an anti-angiogenic effect.[56]

Spironolactone is a competitive MR antagonist drug. Spironolactone is a prodrug molecule and is converted to active metabolites in the liver. It was first used in the treatment of hypertension. Due to its binding to progesterone receptors, it causes gynecomastia, decreased libido, erectile dysfunction, and menstrual irregularities.

Eplerenone has fewer MR antagonist effects than spironolactone and has fewer hormonal side effects. Both molecules cause electrolyte imbalances and hyperkalemia. However, this side effect usually occurs in the presence of renal dysfunction.

It was observed that the foveal subretinal fluid decreased in patients treated with spironolactone and eplerenone.[57,58]

Glucocorticoids play a role in the pathogenesis of CSCR. Therefore, anti-glucocorticoid therapy is among the treatment options for CSCR. Mifepristone (RU-486) is a glucocorticoid and progesterone receptor antagonist. In a study conducted with a small number of patients, the efficacy of mifepristone in patients with chronic CSCR has been demonstrated. However, due to side effects such as hypotension, syncope, vaginal bleeding, and gastrointestinal disorders, it has not been a standard treatment method.

Acetazolamide

Although case reports are showing that acetazolamide treatment reduces subretinal fluid,[59] there is no increase in final BCVA and does not reduce recurrences.[60] Its use can be tried in patients who need rapid recovery.

Beta-Blocker

Case studies have reported that metoprolol, metipranolol, trimepranol, and propranolol provide improvement.[61-64] No significant difference was observed between the non-selective beta-blocker metoprolol and the beta-1-selective blocker metipranolol.[63]

Rifampin

The cytochrome p450 enzyme activator rifampin is believed to treat the manifestations of CSCR by altering the metabolism of endogenous steroids. It has been shown that rifampin decreases subretinal fluid and increases visual recovery in patients with CSCR. In addition, oral rifampin is effective in reducing subretinal fluid and increasing visual recovery in patients with chronic CSCR. It is still in the hypothesis stage that rifampin accelerates the metabolism of endogenous steroids by activating the cytochrome p450 enzyme system and improves the pump function of the RPE and increases the resorption of subretinal fluid. However, the cases should be followed up in terms of gastrointestinal side effects, elevated liver enzymes, and hematological side effects while using this drug.

CONCLUSION

OCT stands out as the gold standard for imaging, diagnosis, and follow-up. Although there is no gold standard method in treatment, reduced dose and low-fluence PDT seems to be the best treatment option.

ETHICAL DECLARATIONS

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Case Report

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Success of the pain relief drug injections in management of the Bertolloti syndrome: case report and review of the literature

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ABSTRACT

Low back pain accompanied by the lumbosacral transitional vertebra (LSTV) is called the Bertolotti syndrome. This report discussed a case treated with combined corticosteroid and local anesthetic injections based on the literature. A 35-year-old female patient was admitted to the hospital suffering from low back pain. On neurological exam, her left sacroiliac joint was painful on palpation. Her muscle strength was full, but the left patella reflex was hypoactive. X-ray images revealed "Castellvi Type IIa" LSTV on the left side; therefore, it was considered that the patient might have Bertolotti syndrome. Because she did not accept surgical intervention, "betamethasone dipropionate+betamethasone sodium" and "bupivacaine hydrochloride" were injected into her bilateral sacroiliac joints, bilateral L3-4, and L4-5 facets, and left LSVT joint under fluoroscopy. Her low back pain vanished immediately after the procedure, and she was discharged from the hospital with a full recovery. With an interval of about six months, she was hospitalized 5 more times with complaints of recurrent low back pain, and at each hospitalization, "local anesthetic" (LA) alone or "local anesthetic+corticosteroid" (LA+S) combination was injected into the primary trigger zones. During long-term follow-up, she continued his daily life without any problems. This case report showed that sequential LA and LA+S administrations could be curative for patients with Bertolotti syndrome who do not accept surgical treatment, or who cannot undergo surgical intervention. Thus, it was concluded that it would be beneficial to conduct studies with larger samples to obtain more precise information about this method.

Keywords: Lumbosacral transitional vertebra, Bertolotti syndrome, injection

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INTRODUCTION

A lumbosacral transitional vertebra (LSTV) is a congenital spinal deformity involving various degrees of sacralization of the lowest vertebra of the lumbar segment or various degrees of lumbarization of the uppermost component of the sacral segment. It has been reported that it could be found within a range of 4% to 30% of the population.[1,2] The etiology and pathogenesis of lumbosacral transitional vertebral formation are unclear. This condition, which has not been associated with any genetic defect or congenital malformation, is usually detected incidentally. In 4.6% to 7% of patients with low back pain, LSTV can be seen, and if low back pain accompanies the diagnosis of LSTV, this condition is called "Bertolotti syndrome", and Castellvi et al.[3] classified it into four subtypes (**Figure 1**).[4-8]

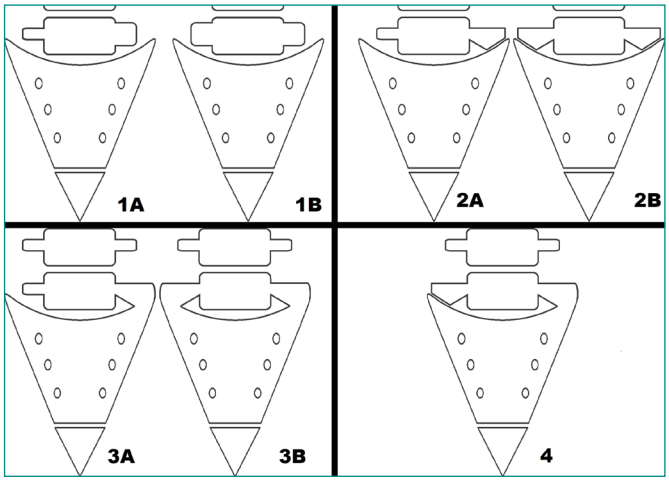

Figure 1: Castellvi classification: Type 1: Enlarged unilateral (1A) or bilateral (1B) dysplastic transverse process; Type 2: Unilateral (2A) or bilateral (2B) pseudoarthrosis between the transverse process and the sacrum; Type 3: Complete unilateral (3A) or bilateral (3B) fusion between the transverse process and the sacrum; Type 4: Pseudoarthrosis on one side and fusion on the other.[3]

Bertolotti syndrome is often diagnosed at an early age (under 30 years of age).[9-15] However, the currently accepted theory is that this syndrome may result from the excessive axial load on the L4-5 joint and the mechanisms of the spine to compensate for this axial load, and this excessive loading may originate from the partial or complete fusion of the L5-S1 joint(s).[9] Although many treatment modalities (such as pain relief drug injection therapy, radiofrequency ablation, or surgical intervention) have been suggested for the treatment of Bertolotti syndrome, an effective treatment method has not been identified yet.[2,16,17]

In this case report, the success of the injection of corticosteroids combined with local anesthetic drugs or injection of local anesthetic drugs for the treatment of a patient with Bertolotti syndrome was discussed in light of the literature.

CASE

A 35-year-old female patient was admitted to the outpatient clinic with the complaint of increasing low back pain predominantly on the left side for several days. She had no chronic disease in her history. Nineteen years, and ten years ago, she had been operated on twice for different levels of intervertebral disc herniations at another clinic. She did not use any medication regularly.

On her physical exam, she had no limitation in sacroiliac joint movements, but her left sacroiliac joint was painful on palpation, and her low back pain increased on the left when the right side stood on one foot. In addition, she suffered from left-sided low back pain that increased with movement, especially during waist flexion and extension movements. Her muscle strength was normal, but the left-sided patella reflex was hypoactive. The patient's lasque, femoral stretching and FABERE/FADIR (flexion, abduction, external rotation, and extension/flexion, adduction, internal rotation) tests were negative.

On her X-ray images, Castellvi type IIa LSTV was seen on the left side and it was thought that she might have Bertolotti syndrome. The spine was stable on the standing lateral hyperflexion and hyperextension X-ray images (**Figure 2**), and no fracture, tumoral mass, erosion, or sclerosis was detected in bone structures on lumbar CT images (**Figure 3**). However, lumbar MR images revealed the L3-4 intervertebral disc herniation that was migrated in the midline inferiorly and the L4-5 intervertebral disc herniation that protruded in the midline of the spinal canal and left neural foramen (**Figure 4**).

Since the patient did not want to undergo surgical treatment, she accepted the recommended injection therapy and was subsequently hospitalized. On the same day, to relieve her low back pain, she was positioned prone on the operating table in the operating room under sedation anesthesia, and betamethasone dipropionate + betamethasone sodium (Diprospan, Schering Plow Medical Products Trade Inc.) and bupivacaine hydrochloride (Marcaine, SanofiİlaçSan. ve Tic. A.Ş., Turkey) was injected to the primary target points (bilateral sacroiliac joints, bilateral L3-4 facets joints, bilateral L4-5 facets, left LSVT joint, and left L5-S1 neural foramen) using a 22G quincke spinal needle (Braun, Germany) under fluoroscopy (Philips, Netherlands) (**Figure 5**). Her low back pain vanished immediately after the procedure. She had no paresis and hipoestesia, and all of lasque, femoral stretching and FABERE/FADIR tests were still negative. The patient was discharged from the hospital with complete recovery on the same day.

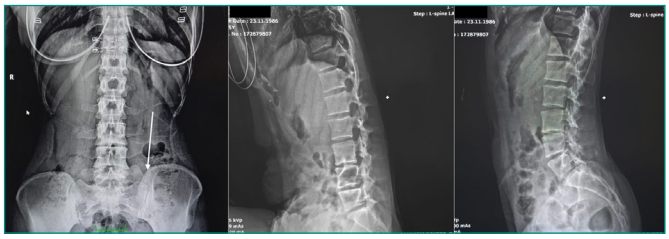

Figure 2: Patient's X-Ray shows the lumbosacral transitional vertebra.

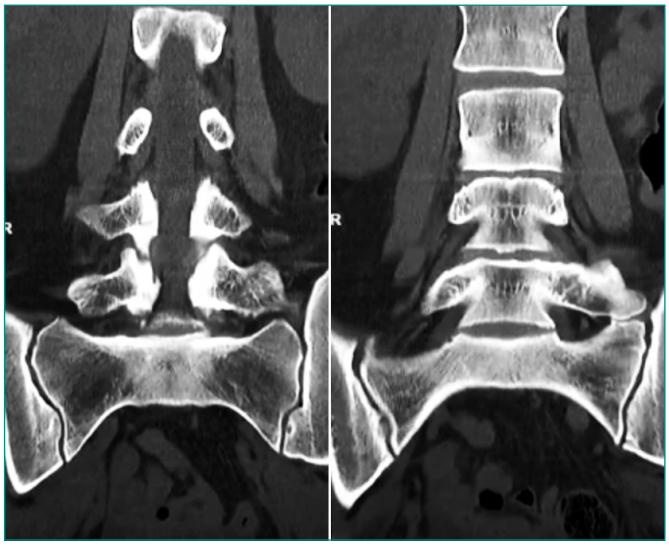

Figure 3: The appearance of the left lumbosacral transitional vertebra on the coronal sections of the patient's computed tomography

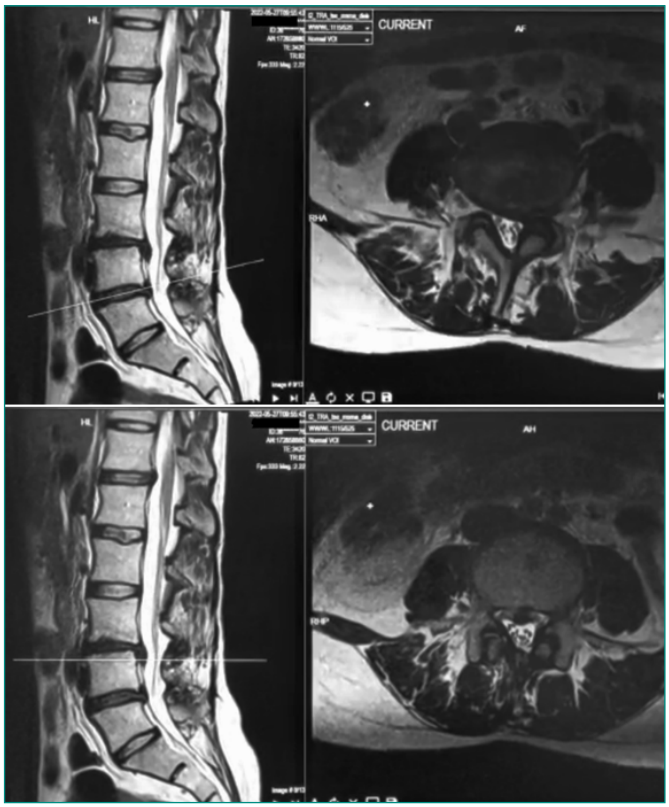

Figure 4: In the lumbar magnetic resonance images of the patient,it is seen that the L3-4 intervertebral disc is protruded in the midline inferiorly in the spinal canal(3A), and the L4-5 intervertebral disc is protruded in the midline and left nerve foramen in the spinal canal(3B).

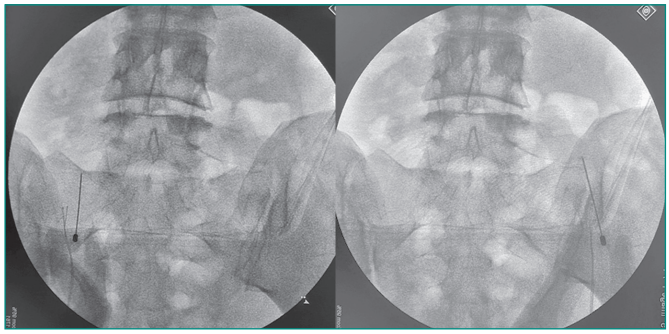

Figure 5: Fluoroscopy images of drug injections applied to relieve the patient's pain.

Since the effect of the injection treatments applied to the patient lasted an average of six months, the injection treatment was repeated every six months. To reduce the corticosteroid load, bupivacaine hydrochloride alone or betamethasone dipropionate+betamethasone sodium combined with bupivacaine hydrochloride was injected alternately every six months on average. During this period, it was learned that she was able to continue her daily work normally and without any problems.

DISCUSSION

The clinical manifestations of LSTV are thought to occur by four main mechanisms: **1)** Problems in the posterior elements, spinal canal, or disc at the level above the transition; **2)** Atypical articulation of spondylolysis in the presence of LSTV; **3)** Contralateral facet joint degeneration in the presence of unilateral LSTV; **4)** Extraforaminal compression due to an enlarged transverse process. Castellvi et al.[8] classified the LSTV into four main groups and subgroups of these groups according to the sides involved and the degree of transition (**Figure 5**). It was reported in the literature that the presence of LSTV Type II and Type IV is correlated with low back pain.[18,19]

For a long time, "Ferguson's Radiography" which is described as A/P lumbosacral radiograph taken at a 30-degree angle to the cranial has been accepted as a standard diagnostic tool for the presence of LSTV. Today, in addition to X-Ray, computed tomography (CT) and magnetic resonance (MR) imaging can show the neural structures and spine in detail and help to determine the decision-making of the treatment methods in patients with LSVT.[2,20] On the other hand, in symptomatic patients, "technetium 99m lumbosacral single-photon emission" tomography (99m Tc SPECT/CT) can be used to define the etiology, and the differential diagnosis of diseases originating from the facet joint or sacroiliac joint. Elevated osteoblastic activity in the LSTV region is specified as a finding in favor of the Bertolotti syndrome. Besides, SPECT/CT may help distinguish patients who can recover with medical treatments or surgical treatment.[15]

In this case, preoperative A/P and dynamic X-rays, CT, and MRI scans were performed and they revealed that the patient had left-sided Castellvi Type IIa LSTV. It was thought that the patient might have Bertolotti syndrome due to the LSVT by low back pain accompanied. No lumbar instability was determined on dynamic lumbar X-ray images, and lumbar CT images revealed no abnormal appearance in the bone structure, and LSVT was found on only the left side. However, MR images revealed L3-4 and L4-5 intervertebral disc herniations, but those disc herniations did not cause any radicular pain or muscle strength loss, although the left-sided patellar reflex was hypoactive. Therefore, this lost reflex finding was thought to be an old deficiency. With these radiological images and neurological examination findings, it was thought that the current low back pain in the patient was caused by LSVT. Although the LSVT was located on the left side, the low back pain of the patient was two-sided. It was thought that the left-sided LSTV might develop the axial imbalance, and cause low back pain indirectly on the right side of the patient. Therefore, bilateral low back pain was associated with LSTV and it was concluded that the patient might have Bertolotti syndrome. The immediate relief of the patient's low back pain after the pain relief drug injections also supported this diagnosis.

To date, various types of conservative treatment (such as analgesic drug use, rest, physiotherapy) and surgical treatment (minimally invasive and invasive) modalities have been described for Bertolotti syndrome in the literature. Minimally invasive surgical treatment options include injection of analgesic and/or anti-inflammatory drugs to the pain side or denervation of the area with radiofrequency.[21,22] Many studies stated that drug injection treatments can provide a 24-month pain-free period in 84-70%of patients, and because of the lower complication rates, it could be considered the primary treatment option. It has also been reported that LSTV can be proven to be the main source of current pain thanks to this drug injection treatment.[22,23] On the other hand, some studies concluded that the success rate of radiofrequency ablation is almost complete, and can be used as the first choice for the improvement of pain in Bertolotti syndrome.[21,24] However, surgical intervention is recommended in the literature for patients with recurrent complaints after pain relief drug injection.[25] Invasive surgical treatment options consist of the removal of the transverse process in that area, osteotomy of the sacral area with a high-speed drill, endoscopic extra foraminal decompression, relief of the area with foraminotomy where the nerve outside the neural foramen is under pressure (far-out syndrome).[26-30]

In our patient, the pain-free time provided by the injection therapy was shorter than the average time stated in the literature. To avoid possible side effects, local anesthetic medication (LA) and combined local anesthetic-corticosteroid medication (LA+S) were administered to the patient sequentially for approximately six-month periods. During the follow-up, it was learned that she could continue her daily life and physical therapy rehabilitation without interruption or any problems.

CONCLUSION

This case report showed that sequential local anesthetic medication and combined local anesthetic + corticosteroid administrations could be curative for patients with Bertolotti syndrome who do not accept surgical treatment, or who cannot undergo surgical intervention. Thus, it was concluded that it would be beneficial to conduct studies with larger samples to obtain more precise information about this method.

ETHICAL DECLARATIONS

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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