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RESEARCH ARTICLE

Development of the Reading Styles Scale and the Identification of Elementary Students' Reading Styles

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Abstract

The purpose of this study was to develop a reading styles scale for students in grades 2, 3, and 4 of elementary school. The study utilized the quantitative research method of survey. The study sample consisted of 510 students in grades 2, 3, and 4 from two districts of a city in the Western Black Sea region. Data collection tools included a personal information form, the reading styles scale, and the attitude toward reading scale. The factor structure of the reading styles scale was determined by using tetrachoric correlation analysis in the Factor 10.10.3 program (Lorenzo-Seva & Ferrando, 2006). As a result, a Reading Styles Scale consisting of 18 items and 4 factors was developed. The relationship between the reading styles of elementary school students, their gender and grade level was determined by using the independent samples *t*-test, analysis of variance, and Tukey's tests in Statistical Package for the Social Sciences Statistics, version 20. It was found that male students in elementary school prefer the kinesthetic reading style more than female students; grade 2 students prefer tactile and kinesthetic reading styles more than grade 3 and 4 students, and grade 4 students prefer the auditory reading style more than grade 2 students.

Keywords: Attitude towards reading, learning style, reading, reading style

Introduction

Reading has been an essential skill for the humankind. Everything in our lives gains meaning through reading (Akça, 2020). Reading is not an innate skill and children cannot learn to do it by themselves. Learning to read takes a long time and requires effort (Güneş, 2017).

Reading is the process of constructing meaning by using prior knowledge, interacting with the writer, and with the support of an appropriate method (Akyol, 2015). During reading, written words are transformed into mental concepts and constructed in the brain by attaching them meaning (Güneş, 2007).

Reading is a mental activity in which the reader combines the information in a text with their prior knowledge in order to create new meaning. Successful readers skillfully and fluently integrate information from a text with their existing knowledge (Anderson et al., 1985). In 1982, Joseph-Jules Dejerine discovered that a disorder affecting a small area in the left visual region of the brain caused significant trouble in reading, and referred to it as the "brain's mailbox." Modern brain imaging has also confirmed the importance of this region for reading. This region in the brain automatically responds to written words for speakers of all languages. In less than a fifth of a second, this area identifies a letter sequence regardless of the size or shape of the letters in it, before conscious perception has even formed. Then, this information is transmitted to two main sets of brain regions distributed in the frontal lobes, which respectively decipher meaning with sound pattern (Dehaene, 2014).

Word recognition problems lie at the basis of reading difficulty. Children who have reading difficulty have trouble recognizing words quickly. As they read, they focus on transforming words into sound rather than comprehending their meaning. Since they do not make time to comprehend, it becomes difficult for them to understand the text (Yılmaz, 2009). While the terms reading difficulty or disorder may be used synonymously with reading difficulty and describe a simple deficiency in reading skills or strategies, they may also refer to a mild or moderate difficulty. Reading difficulty is the state of developing significantly below both the age of a child and their learning potential (Harris and Sipay, 1990).

Theoretical Framework

As learning to read is a tiring, tedious, and difficult process, throughout most of their school years children avoid any practice that will help them become good readers (Carbo, 1998). We can motivate students to learn how to read and write, help them enjoy reading, and ensure that they become fluent readers by focusing on their individual differences (Özdemir, 2013). Every person's physique, intelligence, abilities, interests, emotions, and thoughts are unique. These individual differences also influence individuals' reading development (Akçamete & Avcıoğlu, 1996). One of the best ways to ensure quality education is by creating

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a learning environment that considers individual differences. The differences in students' characteristics have an impact on their learning processes. Contemporary educational understanding necessitates the examination of students' learning processes and learning styles. Identifying students' learning styles and providing education that caters for these styles is essential to achieve permanent learning (Gencel, 2007). Dunn and Dunn (1993) define learning styles as individuals using their unique ways of focusing on the topic and process as they learn new and difficult academic information. Individuals receive information through different senses such as auditory, visual, tactile, and kinesthetic. Approximately 20% of students remember what they hear, while 40% have a higher chance of remembering what they see (Carbo, 2013).

Marie Carbo introduced the concept of reading styles in the 1970s. Reading styles are the adaptation of learning styles to reading instruction. They express how the reading ability is influenced by emotional, sociological, physical, and reading environment factors, as well as the individual's unique information processing style (Carbo, 1995). According to Carbo (1996), reading styles consist of six types: visual, auditory, tactile, kinesthetic, global, and analytical. It is crucial to determine students' reading styles in order to maximize their success (Carbo, 2014). It is essential to focus on students' strengths rather than weaknesses in reading, especially for those with reading difficulty who are global, tactile, and kinesthetic learners (Carbo, 2008b). Each individual has a unique learning style for reading. Reading styles represent an individual's learning style in reading (Carbo, 1980). Individuals with auditory reading style remember what was said and what they heard. They understand repeated information and they learn when they do verbal repetitions and are told aloud what they are asked to do in the best way. Individuals with visual reading style understand in best what they see. They usually remember 75% of what they read or saw. While defining a concept, they prefer having a picture of the concept in the visual learning process, photographs and drawings in printed content (Carbo, 1996, 2008a,b). Students with tactile reading style process information by taking notes and scribbling while listening to the lesson or while being guided about the lesson (Haynes, 2005). Tactile learners need to learn by themselves, they learn best through their own experiences, so they learn better what they do physically. They like to eat while teaching and tend to play with small objects while listening or working (Carbo, 1996, 2008a,b). Students with the kinesthetic reading style learn by touching and moving objects by hand. They need to include their whole body in the teaching process (Haynes, 2005). They are uncomfortable sitting in the same place for a long time and learn better what they are doing physically. Kinesthetic learners need to do it themselves in order to learn (Carbo, 1996, 2008a,b). Students prefer to go from the whole to the parts in the global reading style teaching process. They make decisions according to their intuition and feelings; they do not care about the learning environment, cleanliness, and order. They focus on spontaneous creative thinking and innovation (Carbo, 1987b, 2008a,b). They need written and tactile media in teaching. They enjoy learning about information presented in funny or interesting stories through group work and activities. They like to do different things together. They use a lot of gestures while speaking. They make good use of pictures in the teaching environment (Carbo, 1990, 2008a,b). In the analytical reading style teaching process, students prefer to go from the part to the whole. They make decisions based on logic and common sense and plan and organize well, focusing on details and events. They care about the cleanliness of the learning environment (Carbo, 1987b, 2008a,b). They like to learn the information presented with structured materials in sequential steps under the direction of the teacher. They use numbers and words appropriately and truly in the teaching environment. Students with analytical reading style; they need visual material support during teaching and they read best with auditory sounds, programmed materials, and worksheets (Dean, 1996). Readers with reading difficulties are often incorrectly matched with reading styles that do not suit them. Many readers with reading difficulties cannot find motivation due to feelings of failure and learn through practical application (Carbo, 2014). Research on reading styles indicates that reading style instruction can help even the least academically capable individuals to become competent readers. Guiding principles and advice from reading styles programs send the students a strong message that we respect who they are. Identifying and implementing individual reading styles that suit students is a significant step in minimizing failure (Carbo, 2014). Taking into account a student's reading style in reading activities enhances their motivation, minimizes failure, and accelerates progress (Carbo, 1995). Reading styles encourage student interest in reading and learning (Carbo, 2009). When we teach reading with appropriate reading styles, children start to enjoy reading, borrow more books from the library, and dedicate more time to reading (Carbo, 2008a). A review of the literature shows that there are no studies from Turkey that address reading styles directly and only few studies that may be associated with reading styles (Gül, 2019; Özdemir, 2013). There is no valid and reliable scale in the country to measure students' reading styles, which emerges as a problem that needs to be addressed in terms of education. Therefore, the aim of this study is to develop a reading styles scale and determine the reading styles of students in grades 2, 3, and 4. The following questions were addressed in the study:

- What is the factor structure of the Reading Styles Scale?
- Do the reading styles of students in grades 2, 3, and 4 vary based on gender?
- Do the reading styles of students in grades 2, 3, and 4 vary based on grade level?

Methods

Study Model

This study used the quantitative research model of survey as it aimed to determine the reading styles of students in grades 2, 3, and 4 and to predict their attitudes toward reading through their reading styles.

The survey design aims to reveal the presence and magnitude of a possible relationship between two or more variables (Karasar, 2013). There are three types of survey designs: descriptive, predictive, and model testing. Descriptive design examines the direction and statistical significance of a relationship between variables. Predictive design identifies dependent and independent variables and examines the extent to which a change in the independent variable explains the change in the dependent variable. In model testing, advanced data analysis techniques are used (Özdemir, 2018).

Study Group

To form the study group, a list of elementary schools located in two districts of a Western Black Sea city was made, and eight schools were randomly selected. The reason for selecting eight elementary schools was to ensure the number of accessible students for the study. Students from the second, third, and fourth grades in these eight elementary schools constituted the sample of the study. Data were obtained from a total of 510 students. Data from 255 students (85 from the second grade, 85 from the third grade, and 85 from the fourth grade) were used in the process of scale development, while data from another 255 students (85 from the second grade, 85 from the third grade, and 85 from the fourth grade) were used in the implementation of the final version of the scale. Based on the findings, the factor structure of the scale was established and the reading styles of second, third, and fourth graders were determined.

Scale Development

In this study aiming to determine the reading styles of elementary school students, the Dunn and Dunn Learning Styles (Dunn et al.,1981)

and the Marmara Learning Styles Scale (Şimşek, 2007) were used by the researcher as the basis to develop the Reading Styles Scale for second, third and fourth graders. Before starting the development of the reading styles scale, a literature review was conducted on Turkish and international studies related to learning, learning styles, reading, and reading styles (Carbo, 1987a; Dunn et.al, 1981; Gül, 2019; Özdemir, 2013).

Similar studies and data collection tools were reviewed (Dunn et. al, 1981; Şimşek, 2007). The information thus gathered was compiled, and the necessary documents were organized. With the input and recommendations from three experts, the researcher created a 74-item measurement tool related to the areas the model aimed to measure. After research opinion was taken about whether the items in the scale were suitable for the measurement tool, the scale was administered to 255 elementary school students, 132 girls and 123 boys. The students completed the scale by marking the items that were suitable for them according to the instructions. The collected data were used in factor analysis to establish the factor structure of the scale. As a result of the statistical analysis, unsuitable items were extracted from the scale by taking expert opinions. Based on the findings, it was decided that the scale was ready for implementation and the final version of the scale with 18 items was made. It was then administered on a total of 255 elementary students, 144 girls and 111 boys, from grades 2, 3, and 4. After obtaining expert opinions regarding the scale, exploratory factor analysis (EFA) based on tetrachoric correlation was conducted by using the Factor 10.10.3 program to find the factor structure of the test. The tetrachoric correlation coefficient is used to determine the degree of relationship between two dichotomous categorical variables (Baykul & Güzeller, 2014). As the student responses in the reading styles scale were in the form of yes or no, they were artificially transformed into a binary form of 1–0.

Data Analysis

In the study, it was examined whether the data were suitable for normal distribution. Skewness and kurtosis values were examined. A skewness and kurtosis coefficient between (±2 and ±7) represents a normal data distribution (Finney & DiStefano, 2006; Şimşek, 2007: 74; West et al., 1995). Kline (2005) suggests that a skewness coefficient of ±3 and a kurtosis coefficient of ±10 indicates a normal data distribution. In the present study, skewness and kurtosis coefficients were calculated as −1.979/2.641 and −1.996/4.952. When developing the reading styles scale, data obtained from 255 students in grades 2, 3, and 4 were subjected to EFA based on tetrachoric correlation using the Factor 10.10.3 program (Lorenzo-Seva & Ferrando, 2006). The Kaiser–Meyer–Olkin (KMO) and Bartlett's tests were performed on the values obtained from EFA in order to determine the suitability of the model. Independent samples *t*-test was used to analyze whether reading styles varied based on gender and the presence of a study room. Analysis of variance (ANOVA) was employed to analyze whether reading styles varied by grade level and parental education level, and the Tukey's test was used to analyze the differences identified through ANOVA. The reason for using the Tukey's test is that the number of samples in the groups is equal (Tukey, 1949).

Results

Findings on the Factor Structure of the Scale

According to the EFA results from the scale, the KMO value is 0.85, while the Bartlett's test of sphericity result ($p < .000$) was statistically significant. The goodness-of-fit measures for the test are presented in the table 1.

When the goodness-of-fit measures for the Reading Styles Scale are examined, it can be seen that the four-factor structure had a CFI value of 0.976 ($0.90 \leq CFI \leq 1$), GFI value of 0.976 ($0.90 \leq GFI \leq 1$), AGFI value of 0.928 ($0.95 \leq AGFI \leq 1$), and RMSEA value of 0.046 ($0 < RMSEA \leq 0.05$). Based on the specified fit indices, it was concluded that the model's structure was appropriate.

Table 1.
Compliance Measurements of the Reading Style Scale

	CFI	GFI	AGFI	RMSEA
Four-factor structure	0.976	0.959	0.928	0.046
Criteria	0.90 ≤ CFI ≤ 1	0.90 ≤ GFI ≤ 1	0.95 ≤ AGFI ≤ 1	0 < RMSEA ≤ 0.05

Note: Chan, Lam, Chun and So, 2006.
AGFI=Adjusted Goodness of Fit Index; CFI=Comparative Fit Index; GFI=Goodness of Fit Index; RMSEA=Root mean square error of approximation.

Exploratory factor analysis showed that test items were gathered in four dimensions.

As shown in Table 2, the total variance explained by the scale was 55.1%. Of this variance, 21% was explained by the first factor, 16.4% by the second factor, 10.03% by the third factor, and 7% by the fourth one.

According to the factor analysis conducted on the 74 items in the scale, it was determined that 18 items were grouped under four dimensions.In the analysis, factor loadings as shown in table 3 above 0.30 indicate that the item contributes to the respective dimension. When the factor loadings of all the items in the scale were examined, it was found that the highest item loading was 0.98, while the lowest item loading was 0.37. In terms of the distribution of items across factors, there were six items (0.30–0.52) in the auditory reading style dimension, four (0.48–0.83) in the visual reading style dimension, four (0.43–0.98) in the kinesthetic reading style dimension, and four (0.48–0.61) in the tactile reading style dimension.

Findings on Reading Styles and Gender

Independent samples *t*-test was conducted to determine if there were differences in reading styles among girls and boys in grades 2, 3, and 4.

The mean scores of elementary girls and boys regarding the visual reading style were 5.58 for female students and 5.66 for male students. An independent samples *t*-test was conducted to explore if there was a significant difference between the means of the two groups. The results of the *t*-test showed that there was no significant difference between the mean visual reading style scores of the two groups ($p = .59$; $p > .05$).

The mean scores of elementary girls and boys regarding the tactile reading style were 5.96 for female students and 6.17 for male students. An independent samples *t*-test was conducted to see if there was a significant difference between the means of the two groups. The results indicated no significant difference between the mean tactile reading style scores of girls and boys ($p = .10$; $p > .05$).

Table 2.
Variance Values of Reading Styles Scale Regarding Factors

Factor	Explained Variance	Cumulative Variance
1	0.210	0.21
2	0.164	0.37
3	0.103	0.47
4	0.074	0.55

Table 3.
Reading Style Scale Factors and Factor Loadings

Item Number	Auditory Reading Style	Visual Reading Style	Kinesthetic Reading Style	Tactile Reading Style
1		0.80		
2		0.55		
3		0.83		
4				0.49
5				0.59
6		0.48		
7	0.40			
8	0.70			
9	0.40			
10	0.37			
11				0.48
12				0.61
13	0.50			
14			0.98	
15			0.63	
16			0.65	
17			0.43	
18	0.52			

Table 4.
Independent Samples t-*Test, Results of Reading Styles Regarding Gender*

Reading Style	Gender	*N*	$\overline{\S}$	*S*	*t*	*p*	Cohen's *d*
Visual reading style	Girl	144	5.58	1.25	−.54	.59	–
	Boy	111	5.66	1.17			
Tactile reading style	Girl	144	5.96	.98	−1.65	.10	–
	Boy	111	6.17	.98			
Auditory reading style	Girl	144	9.02	1.15	−.23		–
	Boy	111	9.06	1.21		.81	.31
Kinesthetic reading style	Girl	144	6.51	.88	−2.50	.01*	
	Boy	111	6.81	1.00			

Note: *$p < .05$.

The mean scores of elementary girls and boys regarding the auditory reading style were 9.02 for female students and 9.06 for male students. An independent samples *t*-test was conducted to see if there was a significant difference between the means of the two groups. The results showed no significant difference between the mean auditory reading style scores of the two groups ($p = .10$; $p > .05$).

As shown in Table 4, boys' kinesthetic reading style mean score was 6.81, while that of girls was 6.51. According to the *t*-value and the 95% CI ($p <. 05$), a significant difference was found between male and female students in terms of their kinesthetic reading styles. It was found that male students had a higher preference for kinesthetic reading style compared to females.

Findings on Reading Styles and Grade Level

The ANOVA test was conducted to find if there were any differences in the reading styles of students from grades 2, 3, and 4. In order to determine the reading styles of the students in accordance with their grade level, mean scores were used in the ANOVA analysis.

Table 5 shows that the visual reading styles of elementary students do not vary significantly based on grade level, at the significance level of 0.05.

As depicted in Table 6, a significant difference was observed in the tactile reading styles of elementary students based on grade level at the significance level of 0.05. Findings from the Tukey's test, which was conducted to determine the grade levels that caused this difference, are provided in Table 7.

Table 5.
Variance Analysis Results for Independent groups of Visual Reading Style Regarding the Difference According to the Grade Level

Source of Variance	Sum of Squares	SD	Mean Squares	*F*	*p*
Within groups	3.678	2	1.839	1.238	.292
Between groups	374.424	252	1.486		
Total	378.102	254			

Note: *$p < .05$.

Table 6.
Variance Analysis Results for Independent groups of Tactile Reading Style Regarding the Difference According to the Grade Level

Source of Variance	Sum of Squares	SD	Mean Squares	*F*	*p*
Within groups	16.71	2	8.35	9.05	.000*
Between groups	232.51	252	.92		
Total	249.231	254			

Note: *$p < .05$.

Table 7.
Tukey's Analysis Results for Independent groups of Tactile Reading Style Regarding the Difference According to the Grade Level

Grade Level	$\overline{\S}$	*S*	*f*	*p*	Difference (Tukey)
Second grade (a)	6.41	.84	9.05	.000	a–b
Third grade (b)	5.82	.99			a–c
Fourth grade (c)	5.92	1.03			

Note: *$p < .05$.

Table 7 shows a significant difference at the 0.05 level between the tactile reading style mean scores of students in the second grade compared to those in the third and fourth grades. The mean scores for students in the second, third, and fourth grades were as follows: students in the second grade ($x = 6.41$), students in the third grade ($x = 5.82$), and students in the fourth grade ($x = 5.92$). According to the findings obtained from the scale, it can be concluded that second graders prefer the tactile reading style more than third and fourth graders.

Table 8 shows that a significant difference at the 0.05 level was observed in the auditory reading styles of elementary students based on their grade levels. The findings obtained from the Tukey's test, which was conducted to find the specific grade levels that differed, can be seen in Table 9.

As can be seen in Table 9, there is a significant difference at the 0.05 level between the mean scores of second- and fourth-grade students in terms of auditory reading styles. The mean score for fourth graders was $x = 9.37$ and that of second graders was $x = 8.74$. According to

Table 8.
Variance Analysis Results for Independent groups of Auditory Reading Style Regarding the Difference According to the Grade Level

Source of Variance	Sum of Squares	SD	Mean Squares	*F*	*p*
Within groups	17.27	2	8.63	6.45	.002*
Between groups	337.240	252	1.33		
Total	354.52	254			

Note: *$p < .05$.

Table 9.
Tukey's Analysis Results for Independent groups of Auditory Reading Style Regarding the Difference According to the Grade Level

Grade Level	$\overline{\S}$	*S*	*f*	*p*	Difference (Tukey)
Second grade (a)	8.74	1.17	6.45	.002	a–c
Third grade (b)	9.01	1.27			
Fourth grade (c)	9.37	.99			

Note: *$p < .05$.

Table 10.
Variance Analysis Results for Independent groups of Kinesthetic Reading Style Regarding the Difference According to the Grade Level

Source of variance	Sum of Squares	SD	Mean Squares	*F*	*p*
Within groups	21.11	2	10.55	12.82	.000*
Between groups	207.41	252	.82		
Total	228.52	254			

Note: *$p < .05$.

Table 11.
Tukey's Analysis Results for Independent groups of Kinesthetic Reading Styles Regarding the Difference According to the Grade Level

Grade Level	$\overline{\S}$	*S*	*f*	*p*	Difference Tukey
Second grade (a)	7.03	.79	12.82	.000	a–b
Third grade (b)	6.35	1.00			a–c
Fourth grade (c)	6.54	.90			

Note: *$p < .05$.

these findings, fourth graders prefer the auditory reading style more than second graders do.

Table 10 shows a significant difference at the 0.05 level between elementary students' kinesthetic reading styles based on their grade level. The findings obtained from the Tukey's test, which was conducted to find the grade levels that differed, are given in Table 11.

Table 11 shows a significant difference at the 0.05 level between the mean scores of kinesthetic reading styles of second graders and those of third and fourth graders. The mean score for second graders was $x=7.03$, for third graders $x=6.35$, and for fourth graders $x=6.54$. According to the findings from the scale, it was found that second graders preferred kinesthetic reading style more than third and fourth graders.

Discussion and Recommendations

In this study, the Reading Styles Scale was developed to determine elementary school students' reading styles. It is believed that the scale will be an important tool in personalizing reading instruction for students with and without reading difficulties. It is anticipated that the reading styles of students determined in this study will guide the selection of instructional strategies and activities to be used in future reading instruction programs. Research studies which identify reading styles and implement reading activities accordingly support these predictions. Carbo (1996) reported that by using instruction based on reading styles, a low socioeconomic school in San Antonio improved its ranking from 61st to ninth out of 65 elementary schools within 2 years and surpassed district averages in core subjects the following year. Based on these results, instructional activities were carried out by identifying students' reading styles in 37 elementary schools in San Antonio. In a research study examining the reading habits and achievements of five second-grade students experiencing reading difficulties in a rural area, the Reading Styles Scale was used. The most advantageous learning methods for these students were found to be visual and kinesthetic. By addressing their reading styles and preferred reading environments, the students' reading competence was maximized and successful results in reading proficiency were achieved. This suggests that reading instruction tailored to students' preferred reading styles could have a measurable impact on their academic achievement (Simmons, 2005). Carbo (2009) found that a Texas elementary school implementing reading styles increased its reading achievement test scores from 19 to 98%. The school, which was followed for 10 years, reached exemplary status and maintained this for all the 10 years of observation (Carbo, 2009).

According to the findings related to reading styles and gender of grade 2, 3, and 4 students, there is no significant difference in the mean scores of boys and girls in tactile, auditory, or visual reading styles. However, there is a significant difference in the mean scores of kinesthetic reading style, favoring boys. In other words, male students seem to prefer kinesthetic reading style more than female students. Similar to this finding, Restak (1979) concluded that males prefer kinesthetic learning compared to females. In many previous studies, it was found that males generally tend to maintain tactile and kinesthetic reading styles throughout their lives.

According to the findings regarding reading styles and grade level, a significant difference was found at the 0.05 level between the tactile reading style mean scores of students in grade 2 and those of students in grades 3 and 4. It was also found that second graders prefer tactile reading style more than those in grades 3 and 4. Many studies have indicated that children tend to have tactile and/or kinesthetic reading styles at early ages Restak (1979) also stated that young students prefer the kinesthetic reading style. LaShell (1986) found in a study that students prefer light and sound as they progress in grade level. Koch (1983) conducted a study based solely on age levels without considering reading abilities, and found that second-grade students were predominantly tactile/kinesthetic as compared to fourth-, sixth-, and eighth-grade students, and they showed less preference for visual and auditory learning, which is consistent with the results of the present study (as cited in LaShell,1986).

This study aimed to develop a Reading Styles Scale to determine the reading styles of elementary school students in grades 2, 3, and 4. Future researchers may work on developing reading styles scales for other grade levels. Research may be conducted on the relationships between reading styles and other variables. Different scales can be developed in order to examine reading skills and learning styles. Longitudinal studies may be conducted to examine reading styles in terms of different variables. In research aimed at identifying, eliminating, and improving reading and comprehension difficulties, reading programs may be developed that utilize the Reading Styles Scale to address students' individual reading styles. Finally, "Reading Styles" programs may be alleviated.

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Informed Consent: Verbal informed consent was obtained from the patients who agreed to take part in the study.

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