

# Influence of psychosocial characteristics of patients and opinions of their relatives on indication for surgical treatment of pectus excavatum

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## Introduction

Self-image as well as care for one's health and expectations of that health that might improve after treatment are very important moments for every patient in contact with the physician. At the same time, these phenomena should play a significant role when it comes to setting and evaluating indications for surgical treatment in particular at pectus excavatum (PE) chest wall type of

## Abstract

**Background:** To assess the subjective experience of patients and their parents or relatives about the existing pectus excavatum deformity and to contribute to the definition of indications for surgical treatment of this deformity.

**Methods:** The initial sample of psychosocial characteristics consisted of self-assessments and observations of patients (and parents) regarding their health, self-image, health care, possible environmental response to their physical appearance, expectations regarding treatment. A modified version of the original Nuss questionnaire on quality of life was used in the psychological part of the examination.

**Results:** The study included a sample of 58 patients aged 10 to 30 years, and a sample of 58 family members of the patient (parents, relatives). The experience of poor emotional status, withdrawals, and bad self-image in patients older than 15 years than younger were significant. The tendency for female patients to have a worse experience is pronounced and significant. The largest percentage of parents have an 'indecisive' or 'weakly expressed' attitude towards surgery. Parents at a significantly higher rate show greater concern for female children.

**Conclusion:** A systematic evaluation of the psychosocial perception of patients and their relatives (who will consent for the operation) may be a useful diagnostic assessment before correcting an anterior chest wall malformation.

deformities. They probably should be at the same rank of importance as objective and relatively easier measurable criteria of anatomical, clinical, radiological, and echo-cardiological nature, since they often represent the reason why a patient (or his parents, i.e., relatives) seek help. These phenomena were the backbone of the psychological part of the research inspired by the otherwise, also a new mini-invasive approach of Nuss in the surgical treatment of PE deformities.<sup>1,2</sup>

The aim of this study was to elucidate the importance of psychological phenomena in a preoperative workup and their significance for decisions about further treatment.

## Methodology

### Ethical statement

Both patients and parents gave written informed consent to join the study, which had both – an institutional review board (IRB) and a regional ethics approval.

### Sample of respondents

The study included a sample of 58 patients aged 10 to 30 years undergoing scheduled correction for the PE in our institutions and a sample of 58 family members of the patient (parents, relatives). Psychological analyses were performed separately for those two samples.

### Baseline sample of psychosocial characteristics

The initial sample of psychosocial characteristics consisted of self-assessments and observations of patients regarding their health status, self-image, health care, possible environmental response to their physical appearance, expectations regarding treatment, self-experience after surgery, and other psychosocial aspects are given in 31-Modified versions of the initial questionnaire<sup>3</sup> were prepared for the item. By applying the appropriate data analysis methods, it was determined that in this area of 31 items of these characteristics, there are three latent dimensions, and their nature and the way they were obtained will be described in the results.

### Instruments and method of testing

A modified and expanded version of the original Nuss questionnaire on quality of life was used. The version of the questionnaire used in this study for patients has 31 questions, of which 29 were closed and two open. Twenty-nine closed questions are with suggested answers numbered on a four-point scale of the interval type. Therefore, the data obtained on these issues allow the application of all types of quantitative methods of data analysis. All questions are numbered so that a higher score means a higher degree of care for the health of health disorders and the like, except for questions about the expected effects operations that are coded so that a low score expresses positive expectations. Therefore, these questions, and even the latent dimension they define, have negative signs of all coefficients.

The reliability of the questionnaire is measured by the internal consistency of the question.

### Data analysis methods

Data analyzes were performed by classical procedures of descriptive and nonparametric statistics: analysis of frequencies and relative relations, mean values, standard deviations, medians, contingency relations and significance of differences, and multivariate analysis, primarily factor analysis. To test the difference

significance hypothesis, a significance level of 0.05 was determined. To extract significant factors, that is, determining the number of substantial main components, the characteristic criterion root greater than one was used.

The space of psychological variables that can be related to the decision on surgery, as mentioned earlier, is limited to the 31st indicator, that is, the 31st individual variable for which there is a presumption of possible influence on that decision. More precisely, there are 33 such individual variables because the response modalities are scored as a new variable for some of the initial variables. It is natural to assume that these individual variables are only a manifestation of some latent psychological dimensions. These latent dimensions presuppose the real contents that share the decision on the surgical procedure. For this reason, the findings related to patients' answers to individual questions in the modified and extended Nuss questionnaire were subjected to factor analysis.

## Results

### Number and nature of latent psychological dimensions relevant to decision-making on surgical treatment by patients

There are three significant latent dimensions which structure is given by the content of the questions themselves and can be seen in the following tables.

There are two groups of items within the first latent dimension, different in their content and basic statistical data. The first group of items describes the emotional state of the patient caused by the deformity, while the second group describes the image of oneself Table 1.

Common to all these items is that they have a mean value of the answers to the questions in the questionnaire 2.0 and higher. The maximum response score on each item is 4 and the higher score describes negative emotion (anxiety, sadness) and behaviours related to withdrawals. Therefore, it can be concluded that this is a negative variance of items, which can be interpreted as an unfavourable image of oneself.

Thus, the first latent dimension outcome can be identified as 'poor emotional status, withdrawal, and poor self-image'.

The second latent dimension is defined with only four items that contain the perception of patients' health disorders due to chest deformity Table 2.

The last, third latent dimension isolated from a sample of 33 items intended for examining the psychosocial characteristics of patients with PE deformity was defined with eight items. This latent dimension speaks about the patient's changes in the psychological field and micro social relations that are expected after the operation, and it is essential for the patient's decision to agree to the operation Table 3.

In these modalities, the previous way and direction of coding the answer were changed so the minimum possible answer was one, and the maximum was seven. Therefore, in these questions, the arithmetic means are much larger than in other questions. In addition, for these other questions, the existence of the consequences of the deformity is numbered with the highest score (#4), and for this

**Table 1** Items of the first latent dimension – emotional status, self-image

No	Item content on the first latent dimension	Mean	SD	<i>r</i>	Cronb. alpha
1.	I am preoccupied with thoughts about my physical appearance	2.25	0.77	0.386	0.59
2.	It was happened to be confused or ashamed about the look of my chest	2.32	0.96	0.717	0.564
3.	It was happened to hide my chest	2.48	1.06	0.550	0.576
4.	I am concerned for my health due to deformity	2.75	0.92	0.258	0.606
5.	It happens to me that because of my chest I think badly of myself	1.82	0.90	0.455	0.591
6.	I feel frustrated due to chest deformity	1.66	0.72	0.499	0.592
7.	I am worried about my health due to deformity	2.41	0.78	0.383	0.596
8.	It happens to me that I dislike myself	1.41	0.78	0.405	0.597
9.	I felt less valuable because of breast problems	1.52	0.74	0.528	0.590
10.	I am sad about the look of my chest	2.14	0.96	0.502	0.584
11.	I get anxious and depressed at the thought of the future because of my chest	1.99	0.96	0.628	0.572
12.	I am uncomfortable when I need to change	2.43	1.09	0.604	0.596
13.	It happens to me that because of my chest I do not believe in myself	1.48	0.74	0.650	0.581
14.	Others teased me about my chest	1.45	0.60	0.177	0.614
15.	I was afraid of rejection by my surroundings because of my chest	1.41	0.60	0.177	0.614
16.	I avoid changing in the presence of others	2.09	1.12	0.662	0.561
17.	I do not hang out with my peers because of my breasts	1.16	0.37	0.381	0.609
18.	I camouflage my chest by dressing	2.07	0.99	0.580	0.575
19.	I have no self-confidence	1.98	0.86	0.554	0.583
20.	I'm afraid of surgery	1.73	0.82	0.161	0.614

Arithmetic means (mean) standard deviations (SD), validity of items (*r*), and reliability of items (Cronb. alpha).

**Table 2** Items of the second latent dimension – perception of health disorders

No	Items of the second latent dimension	Mean	SD	<i>r</i>	Cronb. alpha
1.	I feel pain in the chest area	1.54	0.60	0.273	0.609
2.	I have difficulty breathing	1.79	0.87	0.173	0.613
3.	I have heart problems	1.29	0.47	0.250	0.612
4.	I am getting tired from the chest anomaly	2.13	1.01	0.252	0.606

Arithmetic means (mean) standard deviations (SD), validity of items (*r*), and reliability of items (Cronb. alpha).

question with the lowest score. Therefore, all statistical parameters based on correlations (validity and reliability) have minus signs, being rather the consequence of the variables scoring direction, than the actual internal negative values.

### Relationship of latent psychological dimensions obtained in patients with age and sex

The relationship between age, on the one hand, and poor emotional status, withdrawal (first latent dimension), perception of health disorders (second latent dimension), and positive psychological expectations from surgery (third latent dimension), on the other, is given in the following table Table 4.

Patients up to 15 years old were significantly less worried about their appearance, while all the other variables seemed to be evenly represented.

**Table 3** Items of the third latent dimension – positive psychological expectations from the operation

No	Items of the third latent dimension	Mean	SD	<i>r</i>	Cronb. alpha
1.	When you undress to the waist I will feel nice	1.61	0.80	-0.496	0.658
2.	I accept myself as I am	3.02	1.05	-0.406	0.664
3.	I talk to others about the chest problem	2.09	0.82	0.019	0.627
4.	I will look better	3.05	1.59	-0.047	0.664
5.	I will feel stronger	3.16	1.49	-0.018	0.639
6.	I will have more self-confidence	3.20	1.58	-0.442	0.692
7.	I will stop worrying about what others think about my appearance	4.84	1.44	-0.114	0.642
8.	I will be able to do sports activities	3.82	1.88	-0.109	0.663
9.	My life will be happier	2.91	1.53	0.290	0.673

Arithmetic means (mean) standard deviations (SD), validity of items (*r*), and reliability of items (Cronb. alpha).

Another step was to examine the significance of differences between male and female patients in how often they experience poor emotional status, withdrawal, and poor self-image, whether there is an equally perceived perception of health disorders in both sexes, and whether positive expectations of the operation were expressed to the same extent) Table 5.

There is a pronounced tendency for female patients to experience deformities more complex, this difference is statistically significant, at a high level of 0.001.

**Table 4** Relationship between latent psychological dimensions and patient age

No	Age	Latent dimensions											
		Poor emotional status, withdrawals and poor self-image				Perception of health problems				Positive psychological expectations of surgery			
		Very often	Often	Sometimes	Never	Very often	Often	Sometimes	Never	Very often	Often	Sometimes	Never
1.	Up to 15 years	6.0	15.8	29.8	48.5	6.2	16.9	25.4	51.5	31.7	20.2	24.5	23.6
2.	Over 15 years	10.4	17.9	37.5	34.2	9.4	20.0	35.3	35.3	30.8	18.5	26.0	24.9

*P* < 0.001 significant difference; *P* = 0.475 not significant; *P* = 0.967 not significant.

**Table 5** Relationship between latent psychological dimensions and patient sex

No	Sex	Latent dimensions											
		Poor emotional status, withdrawals and poor self-image				Perception of health problems				Positive psychological expectations of surgery			
		Very often	Often	Sometimes	Never	Very often	Often	Sometimes	Never	Very often	Often	Sometimes	Never
1.	Male	7.0	16.5	35.7	40.9	7.1	19.2	30.6	43.1	31.2	19.7	25.3	23.8
2.	Female	17.2	19.5	25.3	37.9	13.3	15.6	33.3	37.8	30.3	16.7	25.8	27.3

*P* < 0.001 significant difference; *P* = 0.474 not significant; *P* = 0.967 not significant.

**Table 6** Items of the first latent dimension in a parent testing

No	Item content on the first factor	Mean	SD	<i>r</i>	Cronb. alpha
1.	My child is worried about his physical appearance	2.80	0.99	0.563	0.874
2.	My child avoids sports and even physical education because of his chest	1.69	0.98	0.385	0.878
3.	My child forgets, does not pay any attention to important details and makes mistakes when he works	1.64	0.65	0.503	0.876
4.	My child is absent. He retreats into his world and does not follow the events around him	1.67	0.72	0.315	0.879
5.	My child avoids hanging out with other children	1.35	0.70	0.319	0.878
6.	My child does not think before he does or says something. He acts before he thinks	1.80	0.70	0.359	0.878
7.	My child exaggerate easily, does not tolerate frustration	2.02	0.78	0.007	0.883
8.	My child is in a quarrelsome mood	1.69	0.74	0.240	0.880
9.	My child has difficulty waiting for the reward and postponing pleasure	1.67	0.74	0.273	0.880
10.	My child gets into potentially dangerous situations	1.24	0.43	0.458	0.876
11.	It seemed to me that my child's ability to control his behaviour did not increase with age	1.53	0.79	0.448	0.876
12.	My child seems slow, sleepy	1.65	0.54	0.023	0.885
13.	My child is tireless, he cannot settle down	1.87	0.92	0.446	0.5876
14.	My child is reluctant to wear a bathing suit	2.40	1.29	0.034	0.886
15.	My child reacts excessively emotionally to small insignificant occasions	2.02	0.85	0.479	0.876
16.	I am worried about my child because of chest problems	3.47	0.74	0.665	0.871
17.	My child is sad and depressed	2.36	1.06	0.606	0.873
18.	My child is worried about his health	2.51	1.00	0.568	0.874
19.	My child's moods change quickly	1.89	0.85	0.667	0.878
20.	My child feels frustrated by a chest deformity	2.16	0.96	0.385	0.878
21.	The other children tease my child for his chest	1.40	0.66	0.506	0.875
22.	Due to the reaction of others, my child withdraws into himself	1.62	0.83	0.470	0.876
23.	I think about the consequences of pectus deformity for the child's future	3.47	0.69	0.455	0.876
24.	My child chooses clothes and dresses to hide the deformity	2.56	1.18	0.607	0.872
25.	Due to the deformity of chest my child has inferiority complex	1.87	0.68	0.549	0.874
26.	My child is afraid that his peers will reject him	1.82	0.88	0.406	0.877

Arithmetic means (mean) standard deviations (SD), validity of items (*r*), and reliability of items (Cronb. alpha).

The latent dimension of—'perception of health disorders' is almost completely evenly distributed between the sexes, as well as the third latent dimension—'positive psychological expectations from the operation' is.

### Number and nature of latent dimensions relevant to decision-making on surgical treatment by parents or relatives

The reliability test of the modified questionnaire for the relatives and parents was obtained by the method of internal consistency, that is, reliability as Cronbach alpha is 0.881.

All parents' answers to the questions in the questionnaire are subjected to the same method of factor analysis to identify latent dimensions in the space of parental answers to the questions in the questionnaire and of course, those dimensions can be compared with those of patients.

**Table 7** Items of the second latent dimension in a parent testing

No	The item's content on the second factor	Mean	SD	<i>r</i>	Cronb. alpha
1.	My child has heart problems	1.42	0.79	0.311	0.879
2.	My child getting tired	1.96	0.90	0.333	0.879
3.	My child has shortness of breath and breathes shallowly	2.04	0.98	0.318	0.879
4.	My child complains for chest pain	1.64	0.85	0.471	0.876
5.	Parents' opinion that surgery can eliminate deformity	3.36	0.87	0.567	0.877

Arithmetic means (mean) standard deviations (SD), validity of items (*r*), and reliability of items (Cronb. alpha).

The results of the factor analysis of the parents' answers to the questions in the questionnaire gave two significant latent dimensions that are at first sight similar to the dimensions obtained from the analysis of the patients' answers Table 6.

A number of these items assume the perception of the child's health status by the parents, emphasizing PE deformity and the child's mental health due to the deformity. From this, it can be concluded that a good part of the variance of this latent dimension is actually the perception of health status. (16, 23, 6, 3, 11, 13, 22, and 25, are the items with significant validity coefficients). In addition to this perception of the child's health status, the latent dimension contains an apparent perception of emotional states, such as the child's concern about physical appearance, emotional response to insignificant occasions, perception of sadness, depression, health, emotional instability (number 1, 17, 18, and 19, have higher coefficients of validity). Emotional status is important for making decisions of patients and parents about surgery. The third group of items presupposes the parental perception of their child's social problems. These items describe the child's issues with his peers and the problems caused by PE deformities (items 5, 6, and 26).

The second latent dimension obtained from the parent's response describes the perception of health disorders by parents caused by chest deformity and positive expectations of surgery Table 7.

### Relationship of latent dimensions obtained based on parents' answers with the age and sex of the patient

The percentages for each modality of the obtained answers of parents to individual questions were calculated (very often, often, sometimes, never) for certain and previously described latent

**Table 8** Relationship between latent dimensions obtained based on parental data and patient age

No	Age	Latent dimensions and parental attitudes											
		Concern about the health emotional and social problems of children				Perception of health problems and expectation of surgery				Positive attitude of parents towards surgery			
		Very often	Often	Sometimes	Never	Very often	Often	Sometimes	Never	High	Moderate	Indefinite	Low
1.	Up to 15 years	16.1	14.4	34.5	35.0	8.3	13.9	30.6	47.2	9.9	22.2	37.0	30.9
2.	over 15 years	14.8	13.6	39.7	39.9	7.6	4.5	39.4	48.5	10.1	13.1	42.4	34.3

*P* = 0.278 not significant; *P* = 0.06 not significant; *P* = 0.514 not significant.

**Table 9** Relationship between latent dimensions obtained based on parental data and patient sex

No	Sex	Latent dimensions and parental attitudes											
		Concern about the health emotional and social problems of children				Perception of health problems and expectation of surgery				Positive attitude of parents towards surgery			
		Very often	Often	Sometime	Never	Very often	Often	Sometime	Never	High	Moderate	Indefinite	Low
1.	Male	14.3	13.4	33.9	38.5	8.3	7.8	36.3	47.5	9.8	15.7	41.8	32.7
2.	Female	21.8	17.1	27.8	33.3	5.6	13.9	30.6	50.0	11.1	25.9	29.6	33.3

*P* < 0.005 significant difference; *P* = 0.594 not significant; *P* = 0.514 not significant.



dimensions and then the significance of differences in percentages by age and sex of patients was tested Table 8.

Expectedly, no significant differences in parents' concern for the patients regarding their age could be established. Of notice might be a rather large percentage of parents having an 'indecisive' or 'weakly expressed' attitude towards surgery (67% and 76% of parents respectively) Table 9.

Parents show more concern for female children at the level of significance.

## Discussion

The indications for treatment of PE are mainly based on physiological symptoms or cosmetic factors.<sup>4</sup> However, the vast majority do not have physical symptoms and in most cases the lung function tests and echocardiography are within normal limits. Indications based on psychological or psycho-social stress are less discussed.<sup>4,5</sup>

We described the way of assessing a psychological indication for operation not only from the patient perspective but also involving the relatives who might approve the operation or recognize it as a solution.

This is an entirely heterogeneous sample in all its characteristics because the nature of PE disease is such that a more homogeneous model cannot be expected. For the same reasons, this sample has the properties of a suitable selection.

Among the sociodemographic characteristics necessary for a good picture of a patient with PE are age and gender. The first is especially insisted on in psychology because age can determine or at least make important differences in almost all psychological phenomena. In addition, it can be expected that patients of different sexes will react differently to the fact that they have a deformity and to the perception of that health problem, the need for surgery, and other important issues that are the subject of this part of the research.

We have found that 48.5% of the patients under 15 years of age do not show a poor perception of emotional status, health disorders, and bad self-image, but also, that a higher percentage of patients over the age of 15 experience these types of difficulties. Older adolescents become more aware of their problems, have more contact with others and therefore more often experience negative emotions, more often have a poor image of themselves and more often notice health problems. This link between body image and self-esteem has already been observed in healthy individuals.<sup>6</sup>

Almost the same picture and regularity exist when the latent dimension 'perception of health disorder' is in question. In that case, these disorders are more often experienced by patients over the age of 15 than by patients under that age, however, did not reach the level of significance.

The third latent dimension—'positive psychological expectations from the operation' shows no differences between patients below and above 15 years of age. Nevertheless, the positive expectations from an operative correction of a deformity exist in a large percentage in both younger (76.4%) and those over 15 (75.3%).

It is a probably fair assumption that human psychology differs significantly depending on gender, so it is very likely that these differences also exist when reacting to PE deformity.

In this study, it was not possible to establish whether the nature and structure of latent dimensions differed between male and

female patients due to the sample size. Therefore, we start from the assumption that poor emotional status, withdrawal, and poor self-image, then that the perception of health disorders and positive psychological expectations from surgery exist in the same form in populations of patients of both sexes, and those manifestations of these dimensions are probably distributed differently by gender.

In males, bad emotional status, withdrawal, and a bad image of oneself never occur or sometimes occur in 76.6% of cases. This percentage for females is 58.2%. Looking only at this isolated data can be assumed that these phenomena contained in the first latent dimension (poor emotional status, withdrawal, and poor self-image) are significantly less present in male patients. This assumption is strongly supported by the fact that men in only 23.5% of cases have these phenomena 'very often' or 'often expressed', This percentage in women is 36.7%.

Signs of this challenging experience of PE deformity in female patients are negative emotions, withdrawal, and poor self-perception. This difference could perhaps be explained by the fact that females are more sensitive to their health and maybe even more to their appearance than males. Particularly, since all patients hit puberty the psychological strain due to the PE has to be interpreted as disadvantageous for their further development.<sup>7</sup> It is important to bear in mind that body image may affect other areas of mental well-being as well, even to a life-threatening degree in more severe cases.<sup>8</sup>

The same space of psychological variables analysed in patients was also examined when the parents of the patients and their close relatives were involved.

Due to the possibility of linking to the results of patients and comparing both results, a parallel questionnaire was applied. Of course, the necessary and minimal changes were made in order to adjust the questions in the questionnaire as much as possible to the parents. The modified questionnaire proved to be very reliable, much more reliable than when the patients were respondents. This difference in reliability may be explained due to an assumption that parents are more objective and calmer in their answers than patients and perhaps even better understand the subject and content of each question than is the case with patients, especially younger ones.

However, the intention to apply this questionnaire to parents, i.e., relatives, is not only a comparison with the results obtained from the patient but also the importance of the parent's attitude towards surgery, their consent to it as well as further data regarding the occurrence of deformities, previous treatment, *etc.* Indeed, there were manifested either implicit or explicit concerns of the parents for the health, emotional and social status of the patients.

While the parents did not seem to differ in their concern about the children nor their perception of health problems and expectations from surgery with regard to their age, it was of a note that the largest percentage of parents have an 'indecisive' or 'weakly expressed' attitude towards surgery. Such a large percentage of parents with an indefinite or weakly expressed attitude can be a consequence of dilemmas and fears of parents about children's surgery, which is probably just normal. Still, they can also result from their trust in doctors that they will know better what is best for their children.

The analysis of the relationship of latent dimensions obtained based on parental responses to the sex of children with deformity

was moderately different. According to the obtained results, parents in a significantly higher percentage show more concern for female children at the level of significance (38.9%: 27.7%). This difference is difficult to understand if the content of the latent dimension is taken into account. Still, if we consider that it primarily contains a variance of concern for emotional and social problems, then the difference becomes more understandable. The fear of parents and the perception of the greater possibility of such issues are presumably enough to describe the differences in the results.

To date, there has been increasing research on the psychological aspects of pectus deformities or other disfiguring conditions in general and medical procedures used to correct them.<sup>9,10</sup> It is already known that patients with PE often experience embarrassment and shame over the perceived differences in their physical appearance, which lead to lowered self-concept, feelings of inferiority, depression, shyness, and social anxiety.<sup>11</sup>

The major deficiency of the paper is that there is no follow-up data to report on the psychosocial state of the patients after surgery and whether the expectations were fulfilled. Moreover, the small number of patients, as well as the uncertainty concerning the distant results of the postoperative condition, limited this study. Those postoperative conditions may change over time, as well as the evolutionary perception of their relatives. However, the aim for interpretation of the results is set only as a framework for preoperative observation in order to avoid operator bias and possibly different interpretations of postoperative results. In addition, the forms given in the research can be taken as a component with which the results will be compared and with which the need for surgical treatment can be objectified. Since there is still a doubt in a certain surgical community about the justification of thoracic resolution of deformities, both morphological and especially psychological, we wanted to achieve objectification of this complex problem from the psychosocial dimension, which affects the whole family.

## Conclusion

A better understanding of the influence of PE on psychosocial functioning, including the identification of patients most vulnerable to psychosocial impairment, is acquired. The definition of the indication should depend on both physical and psychological characteristics in each case. The results obtained give us the right to set hypotheses (concerning young and older adolescents, divided by gender, as well as their parents' attitudes towards the same aspects) that the psychosocial and developmental concept is indispensable in considering complex chest deformities, in this special case of PE. According to this statement, we hope that further research should continue to examine how different criteria can interfere with patient and parent's concerns before and satisfaction after surgical repair.

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## Conflicts of interest

None declared.

## Author contributions

**Marko Kostic:** Writing a draft. **Aleksandar Sretenović:** Conceptualization; data curation; investigation. **Danka Radulović:** Data curation; formal analysis; resources. **Ivona Milačić Vidaković:** Funding acquisition; investigation; methodology; visualization. **Milan Savic:** Providing resources, revision. **Marko Popović:** Data curation; investigation; methodology; resources. **Korkut Bostanci:** Idea, technical support. **Davor Stamenovi:** Supervision, reviewing and rewriting parts of the manuscript.

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