ANXIETY IN PATIENTS UNDERGOING MAGNETIC RESONANCE IMAGING

Paulina BARAN[1], Olaf TRUSZCZYŃSKI[2], Łukasz DZIUDA[3]

[1]Military Institute of Aviation Medicine, Department of Aviation Bioengineering, Warsaw, Poland
[2]Military Institute of Aviation Medicine, Department of Flight Safety, Warsaw, Poland
[3]Military Institute of Aviation Medicine, Technical Department of Aeromedical Research and Flight Simulators, Warsaw, Poland

Introduction: Magnetic resonance imaging (MRI) has become a standard procedure for the diagnosis of central nervous system and musculo-skeletal system disorders. Although MRI provides valuable clinical information, in some patients the procedure can cause discomfort and anxiety associated with the necessity to remain motionless in a closed space of the MRI chamber. The aim of this study was to assess the level of anxiety in patients undergoing magnetic resonance imaging.

Methods: The study involved 52 consecutive patients, 37 women and 15 men, who underwent diagnostic MRI in the Military Institute of Aviation Medicine, Warsaw (MIAM). The State-Trait Anxiety Inventory (STAI) was used in order to measure anxiety before and after MRI.

Results: The mean level of anxiety among the studied patients was not high before nor after MRI, with respective values of 36.58 and 36.92. These means were not significantly different as tested by the Wilcoxon test for dependent samples (p>0.05). A high subjective level of anxiety was declared by 5 patients (ca. 10%) before imaging, and 14 patients (ca. 27%) after imaging, respectively.

Discussion: It is justified to study symptoms of anxiety and claustrophobia in patients undergoing MRI. In such studies, it is recommended to continuously monitor basic physiological parameters, in addition to administering pen-and-paper questionnaires.

Keywords: anxiety, claustrophobia, magnetic resonance imaging, physiological parameters

INTRODUCTION

Magnetic resonance imaging (MRI) has become a standard procedure for the diagnosis of central nervous system and musculo-skeletal system disorders. MRI is helpful in diagnosing abnormalities in all tissues, and especially of the nervous tissue, heart, and muscles [7,10].

The peculiar environment, i.e. a small-sized tube, in which the patient has to remain virtually motionless for a long time as well as the loud noise accompanying the procedure makes MRI an inconvenient study. Research carried out so far has shown that patients undergoing MRI often feel strong anxiety, have panic attacks or other symptoms of claustrophobia [2,9]. It has been demonstrated that neither the position in which the patient remains nor any prior experience with MRI correlate with the reported MRI-related anxiety [11]. Even people who know various techniques of coping with stress and anxiety sometimes experience acute anxiety symptoms or resign from the study [3].

It is estimated that symptoms of claustrophobia, high levels of stress, tension, and anxiety resulting from the fact of being inside an MRI chamber are experienced by up to 35% of all people undergoing this study. In some patients this can even lead to a resignation from MRI [5]. Usually, feelings of anxiety are associated with the limitation of movements, noise or vibrations generated by the device, and fear of being left in a closed chamber. Research has shown that the most challenging part of the examination is the entrance to the study room and then lying down on the examination table.

It should be underlined that extending or interrupting the study as well as administering anxiolytics to symptomatic patients is not always safe or justified. Moreover, it generates additional costs. Some psychological methods can be helpful in reducing the risk of a claustrophobic attack and standardized questionnaires for claustrophobia and anxiety disorders can help in early identification of at-risk patients [5].

The aim of our research was to assess the level of anxiety in patients undergoing magnetic resonance imaging just before and after the procedure. The study was carried out in MIAM.

METHODS

The study involved 52 patients aged 19-81 years (M = 49.44 years; SD = 16.46 years), including 37 women and 15 men. We studied consecutive patients who were undergoing MRI in MIAM. Participation was voluntary. The patients were informed of the aim and methods of the study. They expressed an informed consent for the participation in the study.

The MRI device used was a 1.5-Tesla apparatus (Philips). The enrolled patients underwent MRI of different body parts, most frequently the head and the vertebral column.

The Polish version of the State-Trait Anxiety Inventory (STAI) by C. D. Spielberger, J. Strelau, M. Tysarczyk and K. Wrześniewski was used in order to measure anxiety [12]. This tool is designed for the assessment of the level of anxiety as a current state in response to a given situation and anxiety as a relatively stable personal trait.

The study was carried out in accordance with a repeated measurement design. STAI was used at two time points – before (state and trait anxiety) and after (state anxiety) lying down on the table in the MRI chamber.

The study was approved by the Bioethics Committee of MIAM (decision no. 01/2014).

RESULTS

Statistical analysis was performed with the SPSS software, version 22.

Based on Shapiro-Wilk tests, the distribution of the studied variables, i.e. state anxiety before and after MRI as well as trait anxiety, were slightly different from the normal distribution (p<0.05). Basic

Tab. 1. Distribution parameters of variables measured by STAI in patients undergoing magnetic resonance imaging.

STAI	Women (N = 37)				Men (N = 15)				Total (N = 52)			
	M	SD	Min	Max	M	SD	Min	Max	M	SD	Min	Max
State A before MRI	37.68	10.03	20.0	69.0	33.87	5.95	21.0	46.0	36.58	9.15	20.0	69.0
State A after MRI	37.24	12.53	20.0	65.0	36.13	12.31	22.0	75.0	36.92	12.35	20.0	75.0
Trait A	41.32	10.16	22.0	76.0	38.47	6.07	27.0	47.0	40.50	9.20	22.0	76.0

M – mean, SD – standard deviation, Min – minimal value, Max – maximal value, N – number of participants, A – anxiety

distribution parameters of the STAI scores are presented in Tab. 1.

As presented in Tab. 1, mean state anxiety in patients before lying down in the MRI chamber was 36.58 and was similar after leaving the chamber – 36.92. As the raw score range in both scales of the STAI is 20 (low anxiety) – 80 (high anxiety) points, the level of state and trait anxiety in the studied group was low.

In comparison to 110 patients hospitalized on surgical and gynecological wards of the general hospital in Drezdenko [1] with the mean level of anxiety of 46.89 (SD=12.68), patients undergoing magnetic resonance imaging experienced lower anxiety. Similarly, compared to the mean anxiety in the normalization group of adults [12], the level of anxiety in the studied group was not high.

We also found higher levels of trait anxiety in women in comparison to men (Tab. 1), which is in line with population results [12].

Although there was no statistically significant difference between the mean anxiety scores before and after MRI, as examined by Wilcoxon test for dependent samples (Z=-0.49; p=0.626; p>0.05), the analysis of the normalized scores revealed that a high level of anxiety was declared three times more frequent after the study than before it.

Fig. 1 presents the frequency of low, medium and high scores in anxiety before and after MRI study in the studied patients.

According to the characteristics of the sten scale, scores 1-4, 5-6, and 7-10 were regarded as low, medium and high, respectively.

As seen in Fig. 1, the majority of patients, i.e. 58%, experienced medium anxiety and 17 patients (ca. 33%) did not experience any anxiety before MRI. High anxiety before MRI was declared by 5 patients (ca. 10%). After MRI, 23 patients (ca.

Fig. 1.   Frequency of low, medium and high scores in STAI before and after an MRI study in the studied patients.

44%) had low scores in STAI and high anxiety was present in 14 patients (ca. 27%).

DISCUSSION AND CONCLUSIONS

Although the mean level of anxiety measured by STAI in patients undergoing MRI was not high, as compared to the general population [12], 27% experienced high anxiety after MRI. Moreover, based on data and interviews gathered after the patients left the MRI chamber, 18% of patients declared a high level of anxiety, feeling unwell, discomfort or other claustrophobic symptoms while in the MRI chamber. Two patients resigned from MRI because of high anxiety during the procedure and four patients did not even enter the MRI chamber because of being afraid of reaming in such a small room (they did not fill out the questionnaires).

The discrepancy between the mean anxiety level, as measured by STAI, and the observed anxiety during the MRI procedure can result from the fact that some participants were not aware of their own tendency towards claustrophobia until they found themselves inside the MRI chamber. Supposedly, due to self-presentation, patients did not admit their anxiety before MRI, but their behavior during the procedure, including resignation from or interruption of it, shows that the situation of scanning generates stress and tension.

Although the mean anxiety scores before and after MRI were not statistically significant (p>0.05), based on the analysis of the normalized scores, a high level of anxiety in the STAI was reported almost three times more frequently after MRI than before it, and was reported by 27% of patients. This can result from negative feelings associated with the procedure. It is noteworthy that previous research showed that up to 30% of patients reported a significantly increased number of claustrophobic symptoms after MRI. Some patients declared that MRI triggered claustrophobia for the first time in their lives [6,8].

We report that around 27% of patients declared a high level of anxiety after MRI, whereas in previous studies this was up to 35% [5]. The reason for this reduction can be a growing availability of MRI facilities and a greater experience with this diagnostic method among patients who gradually got accustomed to this procedure.

Our results underline the importance of performing research on anxiety and claustrophobia among patients being diagnosed with the use of devices that require from patients to remain motionless in small spaces. It seems that for a proper
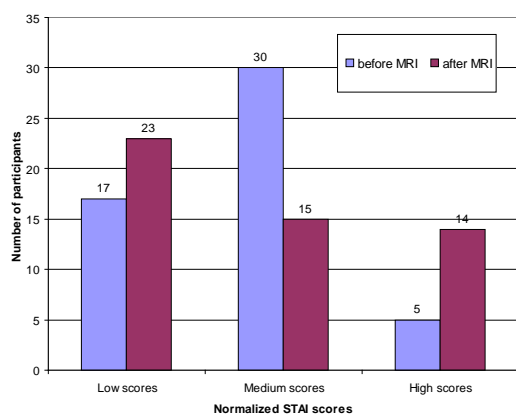
evaluation of anxiety and claustrophobia before and during MRI, objectively measured physiological parameters are needed in addition to pen-and-paper tests. Registration of vital signs in patients undergoing MRI has been widely reported [3,4] although it is not an easy task, requiring special recording devices. However, it provides instantaneous information on the psychophysiological state of the patient during imaging.

AUTHORS' DECLARATION:

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