

Aromatherapy in MRI:

Evaluating the use of Elequil Aromatabs® to Reduce Aborted Scans in Patients with Anxiety and Claustrophobia

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Abstract

Approximately 2 million MRI procedures cannot be completed worldwide due to patient anxiety disorders or claustrophobia. With an average reimbursement of \$500 (U.S.) per MRI scan, this is equal to \$1 billion in lost productivity. On average, 2.3% of patients scheduled for MR imaging suffer from claustrophobia.

The aim of this study was to evaluate the influence of inhalation aromatherapy in the reduction of cancelled or aborted scans (primary endpoint) and reduction in the number of patients requiring more than 15 minutes of coaching in order to complete the examination (secondary endpoint).

Six healthcare facilities (5 hospital-based, 1 stand-alone imaging center) participated in the 4 week study. All patients scheduled for an MRI were to be included. No changes in each facility's scan or patient management protocols were required. Scans at all facilities during weeks 1 and 3 were performed without aromatherapy. Scans at all facilities during weeks 2 and 4 were performed with aromatherapy in the form of a lavender-sandalwood Elequil aromatabs® (Beekley Medical®) for each patient.

A total of 1,086 patients were enrolled in the study: 588 in the control group (C) and 498 in the aromatherapy group (AT). The mean age in both groups was 54; gender breakdown was 43% male, 57% female in the control group and 39% male, 61% female in the aromatherapy group. Due to the fact that 90 more patients were in the control group, it is important to focus on percentage differences rather than number of patients with difficulties completing scans or requiring some length of coaching as indicated in the table below:

Patient Group / # Patients	# Incomplete Scans	% Incomplete Scans	# of Patients Requiring Coaching ≥ 15 Minutes	% Requiring Coaching ≥ 15 Minutes	# of Patients Requiring Coaching < 15 Minutes	% Requiring Coaching < 15 Minutes
Control (C)/588	17	2.89%	16	2.72%	139	23.6%
Aromatherapy (AT)/498	8	1.61%	8	1.61%	91	18.3%

Summary: Inhalation aromatherapy using Elequil aromatabs® resulted in both primary and secondary endpoints being met, demonstrating that it is an effective adjunctive technique to reduce the number/percentage of aborted MRI scans due to anxiety and claustrophobia and the number/percentage of patients requiring 15 minutes or more of coaching time to complete the exam. One can extrapolate these benefits translating to increased patient satisfaction and substantial financial reward over the course of a year.

Background

The first Magnetic Resonance Imaging (MRI) of human anatomy appeared in the early 1970s, however it was Lauterbur in 1976 that is credited with the first in vivo MR image (a mouse with a tumor) that differentiated between normal and pathologic tissue.¹ Early MR images (late 1970s) were based upon proton-density differences, and later upon differences in T1-weighting. By 1982–1983, several MRI research groups pointed out that long, heavily T2-weighted multiecho SE sequences were better at highlighting pathology.^{2,3}

It was not until the mid-1980s that MRI was widely accepted as a new and valuable diagnostic imaging modality. Many additional pulse sequences and imaging techniques were introduced in the late 1980s and 1990s making MRI faster, safer and with improved diagnostic efficacy.⁴

Along with the widespread acceptance of clinical MRI came the expected safety issues with pacemakers and implanted metal devices and the unanticipated problems associated with anxiety and claustrophobia. Early investigations of this phenomenon indicated that 4–30% of patients experienced anxiety-related reactions⁵ and 10–15% of patients required sedation or anesthesia to undergo the

MRI examination.^{6,7} Over 80 million MR procedures are performed each year and, on average, 2.3% (95% confidence interval: 2.0 to 2.5%) of all patients scheduled for MR imaging suffer from claustrophobia. Thus, prevention of cancelled or aborted MR scans due to claustrophobia is an important goal since approximately 2,000,000 MR procedures worldwide cannot be completed due to this situation. At an average reimbursement of \$500 per MR scan, this is equal to a loss of productivity of \$1 billion, which is an important financial loss for the health care system.⁸ The amount of scans that had to be either cancelled or aborted was estimated to be between 3–5% in North America and Western Europe,⁹ representing hundreds of millions of dollars in lost income and an unacceptable delay in diagnosis and treatment.

Numerous attempts to lessen this problem included the installation of microphones in the bore to bring in soothing music; glasses allowing patients to look backward and out of the bore; and changing from supine to prone scanning.¹⁰ Aromatherapy can also help reduce aborted scan in patients with anxiety disorder or claustrophobia when undergoing an MR procedure.

Introduction

Aromatherapy (AT) is the use of concentrated essential oils extracted from herbs, flowers, and other plant parts to enhance a feeling of well-being.¹¹ There are many methods to administer essential oils; inhalation being the simplest and fastest method.¹² Aromatherapy can produce tremendous relaxation in a relatively short period.¹³

More recently, aromatherapy by inhalation has been investigated as a technique to decrease anxiety and / or claustrophobia in colonoscopies and hi-tech imaging procedures.¹⁴ Claustrophobia is a disorder characterized by marked, persistent, and excessive

fear of enclosed spaces.¹⁵ Like anxiety disorder, claustrophobia manifests itself in the extreme case as a panic attack requiring sedation for relief. There has only been 1 study looking at inhalation aromatherapy in MRI where the endpoint (reduced number of motion artifacts) did not reach statistical significance.¹⁶ The number of patients in each group (control and aromatherapy) was about 48 which is considered far too small to have shown statistical significance.

Purpose

To evaluate the influence of inhalation aromatherapy in the reduction of cancelled or aborted scans (primary endpoint) and reduction in the number of patients requiring more than 15 minutes of coaching in order to complete the examination (secondary endpoint).

Methods

Based on a screening questionnaire that was sent to numerous imaging departments, 6 health care facilities (5 hospital-based and 1 stand-alone imaging center) were invited to participate in the aromatherapy study. The protocol was specifically designed to be as simple and non-disruptive as possible. The study was of 4 weeks duration with all patients scheduled for an MRI to be included. No changes in each facility's scan or patient management protocols were required. The patients were not aware of the two different groups. Weeks 1 and 3 were without aromatherapy and weeks 2 and 4 included aromatherapy using a lavender-sandalwood Elequil aromatabs[®] from Beekley Medical[®] for each patient. The information was gathered and analyzed.

Results

A total of 1,086 patients were enrolled in the study; 588 in the control group (C) and 498 in the aromatherapy group (AT). The mean age was 54 in both groups and the gender breakdown (M:F) was 43%:57% for the control group and 39%:61% for the aromatherapy group. There were 17 (2.89%) patients that could not complete the scan in C and 8 (1.61%) in AT. Likewise, there were 16 (2.72%) C patients that required 15 or more minutes of coaching compared to 8 (1.61%) in the AT group. The overall number of patients needing some coaching was 139 (23.6%) in C and 91 (18.3%) in AT.

Discussion

Due to the fact that there were 90 more patients in the C group compared to the AT group, it is important to focus on the percentage differences rather than the actual number of patients. The results shown above indicate that both the primary and secondary endpoints were met and that inhalation aromatherapy using the Elequil aromatabs[®] further reduced the number of aborted scans and the number of patients requiring extensive coaching. The financial implications of the reduction in aborted (incomplete or never started) scans can be seen as follows.

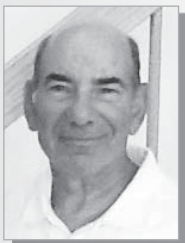
There were a total of 1,086 patients enrolled in the 4 week study. Not all patients who underwent an MRI scan during the four (4) week period were entered into the study. Facilities having multiple magnets usually designated 1 magnet for the Elequil[®] study. The average annual scan volume of each of the six facilities is 6,084. The failure rate in the non-aromatherapy arm (C) was 2.89% which is in

very good agreement with previously published estimates. The failure rate in the AT arm was 1.61%. Thus, the total number of aborted scans annually per facility would be 176 (6,084 x 2.89%) in the control group and 98 (6,084 x 1.61%) in the AT group; representing a reduction in the number of aborted scans of 78/facility. At an average reimbursement of \$500/scan this represents a \$39,000 increase to the department. Subtracting the cost of the Elequil aromatabs[®] (\$2.25 x 6,084 patients = \$13,689) from the increased reimbursement = a total reimbursement gained of \$25,311. Additionally, there will be further savings in both technologist time, money, and patient wait times due to the concomitant reduction in the number of patients (2.72% versus 1.61%, respectively) that required 15 or more minutes of coaching.

Value of Aromatherapy in MRI	
Average cost for an MRI ^{8, 17, 18}	\$500
Average annual scan volume of each of the six facilities	6,084
# of aborted scans anticipated per year without Elequil [®] (2.89%)	176
# of aborted scans anticipated per year using Elequil [®] (1.61%)	98
Potential reduction in aborted scan annually	78
Added reimbursement to department	\$39,000
Price for Elequil [®] for all 6,084 patients at \$2.25 each	\$13,689
Total reimbursement gained	\$25,311

Conclusion

Inhalation aromatherapy using the Beekley Medical[®] Elequil aromatabs[®] has been shown to be an effective adjunctive technique to reduce the number of aborted MRI scans due to anxiety and claustrophobia and also reduces the number of patients that require 15 minutes or more of coaching in order to complete the MRI examination. These benefits translate to increased patient satisfaction and substantial financial reward.



About the Author

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