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Physical Therapy Treatment after Cardiac Surgery : A National Survey of Practice in Greece

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Abstract

Physical therapy is offered to patients undergoing cardiac surgery in many countries. There is limited published data on what physical therapy treatments are provided and what exercises are recommended to patients after cardiac surgery in Europe. The aim of this survey was to establish the current practice of physical therapy for cardiac surgery patients in Greece. A prospective survey was carried out among a total population sample of physical therapists at all public and private cardiothoracic centers in Greece. A postal questionnaire was used to determine the actual physical therapy management of cardiac surgery patients. In total, 45 physical therapists (response rate 78%) from public and private hospitals completed the survey. The mean work experience as physical therapist at a department of cardiothoracic surgery was 10 ± 6 years. Preoperative information was given, according to half of the physical therapists. During the first postoperative days the patients usually received 1 to 6 treatment sessions a day by the physical therapist. Usual physical therapy treatments during the first postoperative days were breathing exercises, coughing techniques, chest wall vibrations, and mobilization. Coughing support was provided to the patients, according to 91% of the physical therapists. Manual coughing support from the physical therapist was the most common technique. In total, 93% of the physical therapists instructed the patients to perform breathing exercises on a regular basis postoperatively. Deep breathing exercises and incentive spirometry were the two most frequently used techniques. Recommendations to continue the breathing exercises for a period of between 3 days and 6 months were given postoperatively. This survey provides an initial insight into physical therapy practice for cardiac surgery patients in Greece. Further comparison between countries is warranted to improve the management of the cardiac surgery patient.

Keywords: Breathing exercises; Physical therapy; Postoperative care; Questionnaire; Thoracic surgery

Introduction

To prevent or diminish postoperative complications, pre- and postoperative physical therapy treatment is often prescribed to cardiac surgery patients during the hospital stay. The physical therapy treatment consists of early mobilization, range of motion exercises, and breathing exercises [1-4]. There is agreement on the value of early mobilization, but there is limited scientific evidence on how the surgery patient actually should be mobilized and exercised during the first days after surgery [4-7]. Different breathing techniques with and without mechanical devices are recommended after cardiac surgery [3,8-11], but there is controversy regarding which breathing techniques are the most effective. Surveys describing chest physical therapy management of patients undergoing cardiac surgery have been carried out in Australia and New Zealand [12], Canada [13] and Brazil [14]. A wide variety of treatments are applied before and after surgery, and there are variations between continents concerning choice of treatment. To date, there are few data available describing physical therapy for cardiac surgery patients in Europe [15,16]. In this national survey current clinical practice of physical therapy for patients undergoing cardiac surgery in Greece was determined.

Material and Methods

Study design

A cross-sectional, descriptive study was carried out to examine the physical therapy management of adult cardiac surgery patients in Greece. The survey applied to chest physical therapy treatment of adult patients undergoing uncomplicated cardiac surgery, including Coronary Artery Bypass Grafting (CABG), mitral, aortic, and tricuspid valve surgery, or a combination of these. A national postal questionnaire survey was sent to all physical therapists working at cardiothoracic centers in Greece, both public and private hospitals. The care of patients developing neurological or circulatory problems or other conditions requiring individualized programs was not considered. Physical therapists that only treated children or patients undergoing other types of cardiac, pulmonary, or thoracic surgery procedures were asked to return the questionnaire unanswered.

Study population

A sample of physical therapists working at departments of cardiothoracic surgery in public (n=10) and private hospitals (n=6) in Greece were sent a postal questionnaire during January 2009. The questionnaire was addressed personally to the 72 physical therapists thus identified. 14 questionnaires were returned from physical therapists not working with the actual patient group, leaving 58 eligible responders. A cover letter and a prepaid response envelope were included with each questionnaire. After 6 weeks the responders were reminded either by e-mail or phone, if the questionnaires had not been

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returned. All departments of cardiothoracic surgery in Greece were identified through a private congress consortium (Triaina), which had an updated registry. The total population sample of physical therapists working in these departments was identified through the Panhellenic Physiotherapy Association Registry to ensure that all relevant physical therapists were included in the survey. The names and addresses of the physical therapists had been identified and double-checked via phone or mail by C.L. at each hospital just before the start of the study. Before the questionnaire was sent, written informed consent was obtained from the heads of the clinics granting permission for their physical therapists to participate in the study.

The lead clinician of each cardiothoracic department at the selected hospitals was contacted by e-mail for permission to carry out the study. Informed consent was obtained from physical therapists to participate in the study, but no formal ethical approval from the National Ethical Review Board was considered, since no patients were included. The results from the questionnaire are confidential, and no association between the results and a specific physical therapist is possible.

Measurements

The questionnaire was developed and constructed following a detailed review of the literature concerning physical therapy treatment after cardiac surgery and has been previously used in a Swedish survey [15,16]. The original questionnaire was translated from Swedish into Greek by a bilingual physical therapist (C.L.), and after that backtranslated by another bilingual health care professional, to ensure correct formulation of the survey questions. Suitable items were modified to Greek conditions as necessary by the physical therapist who conducted the forward translation. The questionnaire consisted of 11 pages of questions on pre- and postoperative physical therapy treatment. Structured and open-ended questions were asked about routine physical therapy care of patients undergoing cardiac surgery. The routine pre- and postoperative care of a hypothetical, "everyday patient" undergoing cardiac surgery was considered to determine the standard clinical practice. The care of patients developing complications or other conditions requiring individualized treatment was not considered.

Statistical analysis

Data were analyzed using descriptive statistics, and the mean, median, and range were calculated. The SPSS version 15.0 software package (SPSS Inc., Chicago, IL) was used for the statistical analysis.

Results

In total, 45 physical therapists replied to the 58 questionnaires sent out, giving a response rate of 78%. The physical therapists (female n=26, male n=19) were aged 40 \pm 8 years, and the mean work experience as physical therapist at a department of cardiothoracic surgery was 10 \pm 6 (range 1-20) years. Twenty-seven (60%) of the respondents had completed specific courses in the cardiopulmonary area. All physical therapists declared that they considered physical therapy necessary after cardiac surgery and 31 (69%) considered the physical therapy treatment offered at their department of cardiothoracic surgery optimal. Reasons given for the treatment not being optimal were lack of resources (personnel), equipment, specialization/education, and collaboration with doctors. Written physical therapy guidelines, protocols or care plans detailing usual physical therapy management of the cardiac surgery patient were available for 5 (11%) of the respondents.

Preoperative information

Preoperative information was offered to all patients undergoing non-emergency cardiac surgery, according to 24 (53%) of the physical therapists. The following topics were most frequently covered in the preoperative information: breathing exercises (64%), coughing techniques (58%), cardiac surgery procedure/opening of the sternum (58%), early mobilization/techniques for getting in and out of bed (29%), lower limb exercises/thrombosis prophylaxis (27%), and poststernotomy restrictions (27%). Preoperative identification of patients at high risk for postoperative complications was noted by 13 (29%) of the physical therapists. Risk factors mentioned were a history of smoking, COPD, chronic renal failure, severe heart disease, and/or previous unsuccessful cardiac surgery.

Physical therapy treatment at the intensive care unit

Forty-one of the physical therapists had some experience of working in the thoracic Intensive Care Unit (ICU). Physical therapy treatment at the thoracic ICU, during the first postoperative morning after surgery, was routinely given to all (n=29) or only specified (n=10) patients (two missing values). No written guidelines or protocols for the physical therapy treatment of intubated patients were available (n=45). Twelve (29%) of the 41 physical therapists working in the ICU performed manual hyperinflation/bagging of the lungs: 21 (51%) performed suction of airways via nose, mouth, or tracheotomy: and 16 (39%) actively participated in the procedure for weaning a patient off the respirator.

Postoperative routine physical therapy treatment

During the first five postoperative days the patients usually received 1 to 6 treatment sessions a day by the physical therapist. Usual physical therapy treatments given to cardiac surgery patients during the first four postoperative days are presented in Tables 1 and 2. In total, 37 respondents indicated that the physical therapist automatically met all patients undergoing cardiac surgery on the ward, while four reported that only certain patients, with special needs, were provided physical therapy postoperatively. During the evenings physical therapy treatment was routinely given on the first and second postoperative day, according to 17 (38%) of the respondents. Seventy-one percent of the physical therapy treatment was routinely given to patients on Saturdays, and the corresponding figure was 58% for Sundays.

Postoperative group training for the patients during the hospital stay was provided by four of the physical therapists. Physical therapysupervised stair climbing prior to discharge was practiced according to 19 (42%) of the physical therapists. Information to the patients about physical activity, exercises, and rehabilitation was provided to the

	POD 1	POD 2	POD 3	POD 4
Breathing exercises	87%	78%	73%	73%
Chest wall vibrations, percussions	71%	69%	62%	53%
Coughing/huffing techniques	78%	73%	69%	64%
Positioning, lying on side	31%	49%	40%	31%
Postural drainage	36%	42%	31%	27%
Relaxation techniques	33%	38%	36%	33%
Massage	7%	7%	7%	4%

Data are presented as the percentage of physical therapists (n=45) POD: Postoperative day

 Table 1: Usual physical therapy treatments given to cardiac surgery patients during the first four postoperative days.

	POD 1	POD 2	POD 3	POD 4
Mobilization to sitting on bed or in a chair	60%	53%	40%	29%
Mobilization to standing	18%	64%	47%	22%
Mobilization to walking in the room	13%	44%	47%	36%
Mobilization to walking in the corridor	7%	38%	51%	51%
Thoracic/upper extremities ROM, unilateral	18%	20%	24%	31%
Thoracic/upper extremities ROM, bilateral	27%	38%	44%	51%
Exercises for the lower extremities	49%	67%	64%	56%

Data shown as % of physical therapists (n=45). POD: Postoperative day; ROM: Range of motion

 Table 2: Physical therapy-supervised mobilization and range of motion exercises usually provided to cardiac surgery patients during the first postoperative days.

patients, according to 33 (73%), before discharge from the department of cardiothoracic surgery.

Breathing exercises

Approximately 90% of the physical therapists instructed the patients to perform breathing exercises on a regular basis postoperatively. Breathing exercises usually provided to the patients on the first postoperative days after surgery are presented in Table 3. The two most frequently used breathing techniques were deep breathing exercises (n=37) and incentive spirometry (n=36). The physical therapists instructed the patients to perform the recommended breathing exercises 1-4 times a day during the first two postoperative days. How many breaths the patients were instructed to perform at each training session varied from one to 40 breaths: 1-10 breaths (n=22), 11-30 breaths (n=7), 40 breaths (n=2), missing data (n=13). Ward staff provided assistance to the patients, in performing breathing exercises, according to 19 of the respondents.

Coughing support was provided to the patients, according to 41 (91%) of the physical therapists. Several methods were used: manual support from the physical therapist (n=35), patient performance with a small pillow (n=30) and without a pillow (n=16) and sternal support with a device such as the Heart Hugger harness (n=7) or with the help of a sheet (n=3).

Instructions to the patients to continue breathing exercises after discharge were given by 38 physical therapists, and of these, 36 provided the patient with a device for the home breathing exercises. The patients were advised to continue the breathing exercises for duration of between 3 days and 6 months postoperatively.

Sternal precautions

Sternal precautions recommended for the healing period during the first postoperative weeks are presented in Table 4. Recommendations for how long after surgery the patients should avoid weight bearing varied between 1 and 18 weeks (mean 7 weeks). How much weight the patients were allowed to lift while the sternum was healing varied between 1 and 5 kg (mean 2 kg).

In total, 27 physical therapists gave individually adapted instructions for getting in, and out of bed, while 12 reported that the patients were instructed using a "standard technique." The two most commonly used techniques for getting out of bed was turning to the side, or moving the legs out of the bed and leaning forward up to a sitting position.

Discussion

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This survey provides an illustration of how chest physical therapy treatment of cardiac surgery patients is carried out in Greece. Most of the physical therapists, 82%, declared that they routinely met all patients undergoing cardiac surgery. During the first five postoperative days the patients usually received 1 to 6 treatment sessions a day by the physical therapist.

To our knowledge previous surveys of physical therapy management of patients undergoing cardiac surgery has been performed in Australia and New Zealand [12], Canada [13] and Sweden [15,16]. The clinical practice in these countries seems to be similar to that in the present study in terms of frequency of assessment, even if choices of treatment techniques differ.

Only 53% of the physical therapists reported that preoperative information was offered to all patients undergoing non-emergency cardiac surgery. This is less than reported in other countries, Australia and New Zealand (94%) [12] and Sweden (88%) [16]. The educational content of the preoperative information was similar, though.

All physical therapists in the present study declared that they considered physical therapy necessary after cardiac surgery. In total, 31% considered that the physical therapy treatment offered at their department of cardiothoracic surgery was not optimal. Reasons given were lack of personnel, equipment, education, and collaboration with doctors. Written physical therapy guidelines, protocols or care plans detailing usual physical therapy management of the cardiac surgery patient at the cardiothoracic surgery ward were only available according to 11% of the physical therapists and no written guidelines for intubated patients were available. This is in accordance with Swedish conditions [16].

Today there is agreement as to the value of early mobilization after cardiac surgery [17,18]. After cardiac surgery the cardiovascular status of the patient is one factor that helps decide the intensity of mobilization. Almost all physical therapists in our study mobilized the patients to sitting and standing in the first postoperative days. The patients' actual mobilization rate would have been interesting to investigate, but this aspect was not covered in this survey, since the

	Rotinely	If needed
Deep breathing exercises	37 (82%)	2 (4%)
Incentive spirometry	36 (80%)	5 (11%)
Diaphragmatic breathing	23 (51%)	15 (33%)
Sustained maximal inspiration	19 (42%)	12 (27%)
Pursed lips breathing	16 (36%)	12 (27%)
Inspiratory muscle training	16 (36%)	11 (24%)
CPAP	3 (7%)	16 (36%)
PEP breathing	0 (0%)	0 (0%)

Data are presented as the number (and percentage) of physical therapists (n=45) CPAP: Continuous positive airway pressure; PEP: positive expiratory pressure

 Table 3: Specific breathing exercises given to cardiac surgery patients during the first postoperative days.

Patients are not allowed to	
Use arms to push up from a lying to a sitting position	(38%)
Use arms to push up from sitting to standing	(38%)
Use stomach muscles to raise themselves from a lying to a sitting position	(16%)
Use arms and shoulders, full active movement	(22%)
Use arms and shoulders, full active movement with 1-2 kg weights	(24%)
Use a rollator (wheeled walker)	(42%)
Use crutches	(49%)

Data shown as number (n) and as % of physical therapists (n=45)

 Table 4: Sternal precautions recommended for the healing period during the first postoperative weeks after cardiac surgery.

routine followed by the physical therapists was the routine determined for a hypothetical "everyday" patient. Positioning to side-lying was used by approximately 50% of the physical therapists, which is more frequently than described in earlier surveys [15]. Positive effects of side lying on lung volumes [19] and oxygenation [20] have been described.

Besides early mobilization, several breathing exercises were applied. In the present study, 93% of the physical therapists instructed the patients to perform breathing exercises on a regular basis postoperatively. Deep breathing was the first choice of breathing technique, and this is in agreement with previous studies [12,13,16]. Incentive spirometry was the second most frequently used breathing technique. The incentive spirometry device is often recommended postoperatively [12,13], but has not been proven to show effect after cardiac surgery [21].

The use of breathing exercises with positive expiratory pressure (PEP) devices has been described as being extensively used in clinical practice postoperatively in Sweden [16] and Brazil [14], despite the lack of evidence of benefit compared with that for conventional deep breathing exercises [22,23]. However, in the present survey no physical therapists used the PEP technique. It is unknown whether the technique is widespread in other parts of the world, and there is currently no evidence to support one breathing technique over another [9,22,24,25].

The physical therapists recommended that patients should perform the breathing exercises 1 to 4 times a day during the first two postoperative days. There is currently no scientific evidence on how often breathing exercises should be performed, but the most commonly suggested frequency is hourly treatment during the first postoperative days after cardiac surgery [1,16,26,27]. Patients were instructed to perform 1 to 40 breaths during each training session, and this is a somewhat larger variation than described in clinical practice in Sweden [16].

During weekends routine physical therapy for patients on their first postoperative day was given more often (Saturdays 71% and Sundays 58%) in the present survey in than in Sweden, (Saturdays 59% and Sundays 31%) [16]. During the evenings physical therapy treatment was routinely given on the first and second postoperative day, according to 38% of the respondents, while in Sweden no evening physical therapy treatment is available. Considering that patients are undergoing surgery on all weekdays, there is a discrepancy in physical therapy treatment accessible to patients, depending on the weekday on which they have their surgery. Patients undergoing surgery in Greece seem to have access to more comprehensive physical therapy than those in Sweden. However, postoperative care is an interdisciplinary activity, and different hospital policies dictate how clinical practice should be performed, making comparisons of treatment between countries difficult. As well, many therapies are applied by other staff members; however, other professional categories were not the focus in this survey.

Shoulder range of motion exercises are intended to improve ventilation, preserve thorax mobility, and ease sternal circulation and healing, even if the efficacy after cardiac surgery has been questioned [5]. In the present survey, mostly bilateral upper extremity exercises were prescribed, rather than unilateral range of motion exercises, in accordance with the results from El Ansaray [28], showing that bilateral upper limb movement was significantly less associated with sternal pain.

Due to sternal precautions, some activities are discouraged after cardiac surgery. Recommendations for how long after surgery the

patients should avoid weight bearing varied between 1 and 18 weeks, and the weight allowed to be lifted varied between 1 and 5 kg. It has been suggested that current activity guidelines for CABG patients are too restrictive [29,30]; however, considering that postoperative sternal instability is a serious complication, the importance of correct instructions is essential.

There are some study limitations that need to be mentioned. In total, 45 physical therapists replied to the questionnaires sent out, giving a response rate of 78%. Considering that all cardiac surgical units in Greece were represented, this could be an acceptable response rate. Various strategies were used to achieve a high response rate, though. The questionnaires were accompanied with self-addressed, stamped envelopes, and the responders were reminded 6 weeks later in cases where the questionnaires had not been returned [31]. Access to a list of all physical therapists identified through a physical therapy association registry ensured that all relevant physical therapists were included in the survey. There is a risk of selection bias, since it is possible that only the most motivated physical therapists responded. Some issues may have been overlooked in the questionnaire, but an exact description of the actual clinical practice is difficult to capture, even with other study designs, such as observational studies. Despite these limitations, we believe that the results from this survey could reflect current clinical practice in Greece, and because a total population sample was surveyed, the external validity of the study is fairly good. This survey provides information that may be useful in the development and implementation of clinical practice guidelines for cardiac surgery patients.

Conclusions

This survey provides an overview of current physical therapy practice for cardiac surgery patients in Greece. The routine use of breathing exercises, coughing techniques, chest wall vibrations, and mobilization is common during the first postoperative days. During the first five postoperative days the patients usually received 1 to 6 treatment sessions a day by the physical therapist. Almost all physical therapists regularly recommended postoperative breathing exercises and coughing techniques. Deep breathing exercises and incentive spirometry were the two most frequently used techniques. Sternal precautions were given routinely, but the advice given varied as to how long after surgery the patients should avoid weight bearing.

In several countries, physical therapy is routinely offered after cardiac surgery. There are various treatment options and opinions about the best way to treat the patients, and this survey provides an insight into the physical therapy practice in Greece. Further comparisons between countries and development of international physical therapy guidelines are warranted to establish the optimal physical therapy practice for cardiac surgery patients.

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