Mobilization and early hospital discharge for patients with acute myocardial infarction – Literature review*

Mobilização e alta precoce em pacientes com infarto agudo do miocárdio - revisão de literatura

Movilización y alta precoz en pacientes con infarto agudo del miocardio. revisión de lieratura

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ABSTRACT

Objective: This study was a literature review with the purpose of analyzing articles comparing early and late mobilization and those comparing early and late discharge for patients with acute myocardial infarction. **Methods:** The literature review was performed using the Lilacs and Medline databases (1966-2007), and the length of the resting period, the hospitalization and possible complications were analyzed. **Results:** We selected 18 articles; 11 of them compared early and late mobilization and 7 compared early and late discharge. The length of the resting period in the early mobilization group varied from 2 to 10 days and 5 to 28 days for the longest resting period. The early discharge group stayed in the hospital from 3 to 14 days and the late discharge group stayed in the hospital from 5 to 21 days. **Conclusion:** The studies show that there is no evidence of complications related to short periods of bed rest and hospitalization.
Keywords: Myocardial infarction; Early ambulation; Patient discharge

RESUMO

Objetivo: Analisar os artigos que comparavam a mobilização precoce com a tardia, bem como aqueles que comparavam a alta precoce com a tardia em pacientes com infarto agudo do miocárdio. **Métodos:** A revisão bibliográfica foi realizado nas Bases de Dados Lilacs e Medline, e foram analisados o tempo de repouso e de hospitalização e as complicações observadas nos estudos. **Resultados:** Foram selecionados 18 artigos, divulgados entre 1996 e 2007, sendo que 11 comparavam a mobilização precoce com a tardia e 7 a alta precoce com a tardia. O período de repouso no leito para mobilização precoce variou de 2 a 10 dias e de 5 a 28 dias para mobilização tardia. Com relação ao tempo de hospitalização observou-se que o período de alta precoce variou de 3 a 14 dias e de 5 a 21 dias para alta tardia. **Conclusão:** Os estudos mostram que não há evidências de maiores complicações relacionadas a curtos períodos de repouso e de hospitalização.
Descritores: Infarto do miocárdio; Ambulação precoce; Alta do paciente

RESUMEN

Objetivo: Analizar los artículos que comparaban la movilización precoz con la tardía, así como aquellos que comparaban el alta precoz con la tardía en pacientes con infarto agudo del miocardio. **Métodos:** La revisión bibliográfica fue realizada en las Bases de Datos Lilacs y Medline, y fueron analizados el tiempo de reposo y de hospitalización y las complicaciones observadas en los estudios. **Resultados:** Fueron seleccionados 18 artículos, difundidos entre 1996 y 2007, de los cuales 11 comparaban la movilización precoz con la tardía y 7 el alta precoz con la tardía. El período de reposo en la cama para la movilización precoz varió de 2 a 10 días y de 5 a 28 días para la movilización tardía. Con relación al tiempo de hospitalización se observó que el período de alta precoz varió de 3 a 14 días y de 5 a 21 días para el alta tardía. **Conclusión:** Los estudios muestran que no hay evidencias de mayores complicaciones relacionadas a los cortos períodos de reposo y de hospitalización.
Descriptores: Infarto del miocardio; Deambulación precoz; Alta del paciente

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INTRODUCTION

Cardiovascular diseases are the main causes of hospitalization and death in Brazil, and acute coronary syndrome (unstable angina and acute myocardial infarction) is the major responsible factor[1-2].

Acute myocardial infarction is the death of myocardial cells due to long-term ischemia resulting in a total or partial occlusion of the coronary artery[3]. One of the prescribed treatments is bed resting, because it reduces the body demands and oxygen consumption, helping to avoid more serious ischemia.

In the 1940s and 1950s, the acute myocardial infarction was treated in bed. The patient used to rest for six to eight weeks in order to heal the ventricular wall, because physical activity could increase the possibility of complications[4]. However, patients who were resting for a long time started to show other symptoms like: muscle atrophy, constipation, urinary retention, decubitus ulcers, thrombophlebitis, pulmonary embolism, pneumonia, atelectasis, postural hypotension and depression[5].

Since then, there have been new studies observing that rehabilitation during the acute phase of the infarction can reduce deleterious effects after a long resting time, and also shorten the hospital stays[6-8]. According to our professional experience at the Coronary Unit, it is possible to say that there is neither consensus nor patient reports about the length of the resting period, or about how long patients with acute myocardial infarction were in the hospital. The literature has few studies about the topic.

It is known that mobilization and early hospital discharge bring benefits to patients; thus, we believe that it is necessary to search for articles describing possible complications related to the length of the resting period and hospital stays in order to define and indicate when patients can be mobilized and get hospital discharge after a given hospital stay.

OBJECTIVE

Analyzing published studies comparing early and late mobilization, the ones comparing early and late hospital discharge in patients with acute myocardial infarction, identifying the length of the resting period and hospital stay, and also the complications found in those groups.

METHODS

This study was a literature review guided by two questions: "Which complications did the patients with acute myocardial infarction with early mobilization have, when compared to those with late mobilization?" and "Which complications did the patients with acute myocardial infarction who had early hospital discharge have, when compared to those who had late hospital discharge?"

The literature review was performed by using the LILACS and MEDLINE databases. Physical restraint, bed resting, early mobilization and early hospital discharge were used as descriptors.

Some texts and some references about related articles were sought electronically. Articles published between 1966 and 2007 were selected, according to the following aspects: articles written in English, Spanish and Portuguese, published in national and international journals; those which were fully accessible and with comparative data between early and late mobilization, and/or early and late hospital discharge after acute myocardial infarction. Articles evaluating patients after some type of surgery were excluded.

An instrument including the following items was created to collect data: identification of the article (title, name of the journal and authors); year of publication; institution where the study was performed (university, public hospital, private hospital); language of the article (Portuguese, English, Spanish); type of publication (cross-section research, case report, control-case, clinical essay); sample size; time used for early and late mobilization, for early and late hospital discharge and the complications found in those groups.

A comparative analysis was performed after data collection in order to investigate complications and mortality in the group comparing early and late mobilization and in the group comparing early and late hospital discharge.

RESULTS

Seven hundred forty-eight abstracts of articles using the five descriptors mentioned above were found (Medline: 736; Lilacs; 12). After the authors finished reading them, 65 potentially relevant articles for the research were identified; 18 articles were included in the study according to the inclusion criteria.

A study of systematic with meta-analysis review, comparing early and late mobilization of patients with acute myocardial infarction without complications, was also found and used in the discussion of the results. All articles selected were in English; 12 of them were randomized clinical essays; one was multicentric and six were prospective observational.

Seven (38.9%) studies were performed in university hospitals, 4 (22.2%) in private hospitals and 7 (38.9%) in universities. Most of the articles were published in the 1970s and 1980s; two articles comparing early and late hospital discharge were published in 2003 and 2007.

Personal data such as age and gender were absent in many articles and, as such, it was not possible to associate them with complications related to early and late mobilization.

Early and late mobilization

Among 18 selected articles, 11 compared early and late mobilization[6, 9-18] in 2233 patients; 1059 patients had

Chart 1 – Studies comparing early and late mobilization after acute myocardial infarction

Authors	Year of publication	Number of patients		Mobilization	
		Early N	Late N	Early	Late
Beckwith[9]	1954	39	41	2nd day	28th day
Harpur[10]	1971	95	104	8th day	21st day
Lamers[11]	1973	102	100	10th day	20th day
Bloch[6]	1974	77	77	2nd-3rd day	+ 3rd week
Hayes, Morris, Hampton[12]	1974	107	82	2nd day	9th day
Miller[14]	1976	21	8	3rd day	5th day
Hayes, Morris, Hampton[13]	1976	84	62	2nd-9th day	+ 9th day
Lindvall[18]	1979	42	138	4th day	9th day
Messin[16]	1982	49	49	5th day	8th day
Rowe[17]	1989	45	55	4th day	7th day
West[15]	1979	347	395	5th day	10th day

Chart 2 – complications during hospital stays and number of patients with acute myocardial infarction who had complications after early and late mobilization

Complications	Articles which describe the complication	N and % of patients who had the complications	
		Early Mobilization	Late Mobilization
Readmittance	Hayes, Morris, Hampton[12]; Lindvall[18]	12 (8.05%)	15 (7.11%)
Re-infarction	Harpur[10]; Lamers[11]; Bloch[6]; Hayes, Morris, Hampton[12]; Messin[16]; Lindvall[18]	34 (7.2%)	26 (5.89%)
Angina	Lamers[11]; West[15]	113 (25.17%)	121 (24.45%)
Cardiac failure	Beckwith[9]; Hayes, Morris, Hampton[12]	12 (8.2%)	8 (6.5%)
Increased area of myocardial necrosis	Beckwith[9]	2 (5.3%)	1 (2.43%)
Cerebro-vascular accident (stroke)	Beckwith[9]	0 (0%)	1 (0.93%)
Deep Venous Thrombosis	Hayes, Morris, Hampton[12]; Miller[14]; Hayes, Morris, Hampton[13]	43 (16.35%)	26 (11.76%)
Arrhythmia	Beckwith[9]; Hayes, Morris, Hampton[13]; Lamers[11]; Bloch[6]; Hayes, Morris, Hampton[12]; West[15]	144 (22.12%)	167 (23.29%)
Shock	Beckwith[9]	6 (15.39%)	6 (14.63%)
Dyspnea	West[15]	117 (33.71%)	118 (29.87%)
Congestive cardiac failure	Harpur[10]	3 (3.16%)	8 (7.69%)
Bronchopneumonia	Bloch[6]	2 (2.6%)	4 (5.19%)
Gastric bleeding	Bloch[6]	0 (0%)	2 (2.6%)
Precordialgia	Hayes, Morris, Hampton[12]	4 (3.74%)	7 (5.43%)
Ventricular aneurysm	Harpur[10]	4 (4.21%)	3 (2.88%)
Pulmonary thromboembolism	Lamers[11]; Bloch[6]	3 (1.67%)	2 (1.13%)

Chart 3 – Studies comparing early and late hospital discharge after acute myocardial infarction

Author	Year of publication	Number of hospital discharges		Variation in the period of hospital discharge	
		Early N	Late N	Early	Late
Boyle[19]	1972	201	94	7 to 10 days	More than 10 days
Hutter[20]	1973	69	69	14th day	21st day
Ahlmark[22]	1979	128	124	8th day	15th day
Baughman[21]	1982	64	59	14th day	21st day
Cheng[23]	1986	34	34	5th day	10th day
Yip[25]	2003	266	197	<4 days	>4 days
Barchielli[24]	2007	115	327	3rd and 4th day	9th day

Chart 4 – Complications after patients with acute myocardial infarction were discharged from the hospital, articles describing them and the number of patients who had presented them again, according to early and late hospital discharge.

Complications	Articles describing the complication	N and % of patients who presented the complications again	
		Early hospital discharge	Late hospital discharge
Readmittance	Boyle[19]; Hutter[20], Ahlmark[22], Cheng[23], Barchielli[24]	203 (23.36%)	84 (18.46%)
Re-infarction	Hutter[20]; Baughman[21] Ahlmark[22], Cheng[23], Barchielli[24], Yip[25]	61 (5.18%)	34 (5.51%)
Angina	Hutter[20]; Baughman[21] Ahlmark[22] Cheng[23], Yip[25]	33 (5.88%)	42 (8.64%)
Cardiac Failure	Hutter[20] Ahlmark[22]	10 (4.33%)	6 (2.64%)
Arrhythmia	Ahlmark[22]	1 (0.78%)	1 (0.81%)
Revascularization	Barchielli[24], Yip[25]	118 (13.36%)	16 (4.83%)
Renal Failure	Yip[25]	1 (0.37%)	0 (0%)
Pneumonia	Yip[25]	0 (0%)	1 (0.51%)
Gastric Bleeding	Yip[25]	0 (0%)	1 (0.37%)
Pseudoaneurysm	Yip[25]	1 (0.37%)	0 (0%)

early mobilization and 1174 had late mobilization.

Chart 1 shows that patients with early mobilization rested from 2 to 10 days (4.3 days in average), and the resting period for the group that rested longer was between 5 and 28 days (13 days in average).

Re-infarction and arrhythmia were examples of complications in six articles; 14% of the patients had arrhythmia, 10.5% had dyspnea and 10.4% had angina. Chart 2 shows that both groups, early and late mobilization, had a similar amount of complications.

Nine articles reported death[6, 9-12, 15-18] and three of them compared it to mortality after hospital discharge [11,15,17]; 8.2% of the patients died, 41.8% belonged to the early mobilization group and 58.2% to the late mobilization group.

Three articles presenting information about returning to work[6,10,16], showed that patients who had early mobilization returned earlier to their jobs (12 weeks in average) when compared to those who had late mobilization (15 weeks in average).

Five articles analyzed[6,10,12,15,18] compared mobilization and hospital discharge, showing that the early mobilization group stayed in the hospital for 16.2 days in average, and the average period for the late mobilization group was 20.9 days.

Early and late hospital discharge

Among 18 selected articles, 7 were related to early and late hospital discharge[19-25] with 2090 patients; 1379 patients had early hospital discharge and 711 had late hospital discharge.

Chart 3 shows that patients who had early hospital discharge stayed in the hospital from 3 to 14 days (8 days in average) and the group who had late hospital discharge stayed in the hospital between 5 and 21 days (in average 11.5 days).

Hospital returns (13.7% of the patients), revascularization (6.3% of the patients), re-infarction

(4.5% of the patients) and angina (3.6%) were the main complications reported in the studies. Chart 4 shows that both groups, early and late hospital discharge, had similar complications.

Regarding death, 4.1% of the patients died; 45.3% of the patients belonged to the group of early hospital discharge and 54.7% of the patients belonged to the group of late hospital discharge.

One article presented information about patients after hospital discharge returning to work(20). It showed that patients from the early hospital discharge group returned earlier to their professional activities (12.4 weeks in average) than those from the late hospital discharge group (13.8 weeks in average).

DISCUSSION

Most of the selected articles about the topic had been written in a not-so-recent past, and were in English. This shows the need of having new studies including national ones.

It was difficult to compare the data of the articles due to the heterogeneity of both the methods used in the studies and the duration of mobilization and early and late hospital discharge; the present study does not present data about age and gender of the participants because the studies analyzed lacked of this type of information.

It is possible to assume that shorter resting periods are as safe as longer resting periods because it causes no or very few complications. A systematic review, 2003, comparing early and late mobilization in patients with acute myocardial infarction with no complications, agrees with that statement[26].

The results showed that early mobilization is safe and can also decrease the length of hospital staysand after the discharge, patients feel able to go back to work earlier than the late mobilization group. According to Fletcher et al[7], working outstide the house improves self-confidence and decreases the anxiety about daily physical activities, motivating the patient to return to his daily routine.

Comparing our study to the systematic review[26], it is possible to notice that among 15 articles used in the review, 12 were also used in our study, along with other two other articles[11,18]; that shows that we used most of the studies available in literature. It is important to say that even when the author pointed the need for new studies about the topic, no other study was found.

According to studies comparing early and late hospital discharge, it is possible to assume that patients could stay in the hospital for a shorter time, because the complications and mortality in both groups were similar. Nowadays, low-risk patients with acute myocardial infarction can stay in the hospital for three or four days because of the improvements on reperfusion therapy[27, 28]; this brings benefits to the patients and the hospital because costs decrease[28].

CONCLUSION

Studies show that there is no evidence of complications due to short resting periods and early hospital discharge. We assume that the patient can be early mobilized (from 2 to 10 days) and the hospital stays can also be shortened (from 3 to 14 days), which contributes to the healthcare quality and lower hospital costs.

However, due to improvements on the reperfusion therapies and since the studies analyzed are not up-to-date, it is necessary to have new studies comparing mobilization and early and late hospital discharge in order to safely determine how many days after an acute myocardial infarction the patient can be mobilized and have early hospital discharge without complications.

REFERENCES

1. Brasília. Ministério da Saúde. Base de dados de morbidade hospitalar do SUS, Brasil, 2004 [Internet]. Brasília: DATASUS;c2003. [citado 2005 Mai 18]. Disponível em http://www.datasus.gov.br.
2. Brasília. Ministério da Saúde. Base de dados de mortalidade, Brasil, 2002 [Internet]. Brasília: DATASUS; c2003. [citado 2005 Mai 18]. Disponível em http://www.datasus.gov.br.
3. Joint European Society of Cardiology/American College of Cardiology Committee. Myocardial infarction redefined. A consensus document of the Joint European Society of Cardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. Eur Heart J. 2000;21(18):1502-13.
4. Lewis T. Diseases of the heart. 4th ed. London: Macmillan;1946.
5. Winslow EH. Cardiovascular consequences of bed rest. Heart Lung. 1985; 14(3):236-46.
6. Bloch A, Maeder JP, Haissly JC, Felix J, Blackburn H. Early mobilization after myocardial infarction. A controlled study. Am J Cardiol.1974; 34(2):152-7.
7. Fletcher GF, Balady G, Froelicher VF, Hartley LH, Haskell WL, Pollock ML. Exercise standards. Writing Group. A statement for healthcare professionals from the American Heart Association. Circulation. 1995; 91(2):580-615.
8. Piegas L, Timerman A, Nicolau JC, Mattos LA, Rossi Neto JM, Feitosa GS, et al. III Diretriz sobre tratamento do infarto agudo do miocárdio. Arq Bras Cardiol. 2004; 83 (Supl 4):1-86.
9. Beckwith JR, Kernodle DT, Lehew AE, Wood JE Jr. The management of myocardial infarction with particular reference to the chair treatment. Ann Intern Med. 1954; 41(6):1189-95.
10. Harpur JE, Conner WT, Hamilton M, Kellett RJ, Galbraith HJ, Murray JJ, et al. Controlled trial of early mobilisation

and discharge from hospital in uncomplicated myocardial infarction. Lancet. 1971; 2(7738):1331-4.

11. Lamers HJ, Drost WS, Kroon BJ, van Es LA, Meilink-Hoedemarker LJ, Birkenhäger WH. Early mobilization after myocardial infarction: a controlled study. Br Med J. 1973; 1(5848):257-9.
12. Hayes MJ, Morris GK, Hampton JR. Comparison of mobilization after two and nine days in uncomplicated myocardial infarction. Br Med J. 1974; 3(5922):10-3.
13. Hayes MJ, Morris GK, Hampton JR. Lack of effect of bed rest and cigarette smoking on development of deep venous thrombosis after myocardial infarction. Br Heart J. 1976; 38(9):981-3.
14. Miller RR, Lies JE, Carretta RF, Wampold DB, DeNardo GL, Kraus JF, et al. Prevention of lower extremity venous thrombosis by early mobilization. Confirmation in patients with acute myocardial infarction by 125I-fibrinogen uptake and venography. Ann Intern Med. 1976; 84(6):700-3.
15. West RR, Henderson AH. Randomised multicentre trial of early mobilisation after uncomplicated myocardial infarction. Br Heart J. 1979; 42(4):381-5.
16. Messin R, Demaret B. Accelerated versus classical early mobilization after myocardial infarction. Adv Cardiol. 1982; 31:152-5.
17. Rowe MH, Jelinek MV, Liddell N, Hugens M. Effect of rapid mobilization on ejection fractions and ventricular volumes after acute myocardial infarction. Am J Cardiol. 1989; 63(15):1037-41.
18. Lindvall K, Erhardt LR, Lundman T, Rehnqvist N, Sjögren A. Early mobilization and discharge of patients with acute myocardial infarction. A prospective study using risk indicators and early exercise tests. Acta Med Scand. 1979; 206(3):169-75.
19. Boyle DM, Barber JM, Walsh MJ, Shivalingappa G, Chaturvedi NC. Early mobilisation and discharge of patients with acute myocardial infarction. Lancet. 1972; 2(7767):57-60.
20. Hutter AM, Sidel VW, Shine KI, DeSanctis RW. Early hospital discharge after myocardial infarction. N Engl J Med. 1973; 288(22):1141-4.
21. Baughman KL, Hutter AM, DeSanctis RW, Kallman CH. Early discharge following acute myocardial infarction. Long-term follow-up of randomized patients. Arch Intern Med. 1982; 142(5):875-8.
22. Ahlmark G, Ahlberg G, Saetre H, Haglund I, Korsgren M. A controlled study of early discharge after uncomplicated myocardial infarction. Acta Med Scand. 1979; 206(1-2):87-91.
23. Cheng J, Kho JH, Chan A. Early hospital discharge for male patients with uncomplicated myocardial infarction. Singapore Med J. 1986; 27(5):416-8.
24. Barchielli A, Balzi D, Marchionni N, Carrabba N, Margheri M, Santoro GM, et al. Early discharge after acute myocardial infarction in the current cinical practice. Community data from the AMI-Florence Registry, Italy. Int J Cardiol. 2007; 114(1):57-63.
25. Yip HK, Wu CJ, Chang HW, Hang CL, Wang CP, Yang CH, et al. The feasibility and safety of early discharge for low risk patients with acute myocardial infarction after successful direct percutaneous coronary intervention. Jpn Heart J. 2003; 44(1): 41-9.
26. Herkner H, Thoennissen J, Nikfardjam M, Koreny M, Laggner AN, Müllner M. Short versus prolonged bed rest after uncomplicated acute myocardial infarction: a systematic review and meta-analysis. J Clin Epidemiol. 2003;56(8):775-81.
27. Newby LK, Califf RM, Guerci A, Weaver WD, Col J, Horgan JH, et al. Early discharge in the thrombolytic era: an analysis of criteria for uncomplicated infarction from the Global Utilization of Streptokinase and t-PA for Occluded Coronary Arteries (GUSTO) trial. J Am Coll Cardiol. 1996; 27(3):625-32.
28. Hanlon JT, Combs DT, McLellan BA, Railsback L, Haugen S. Early hospital discharge after direct angioplasty for acute myocardial infarction. Cathet Cardiovasc Diagn. 1995; 35(3):187-90.