Post Radial Artery Harvest Hand Perception

— Postoperative 12-month Follow-up Results —

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The 12-months' follow-up results for radial artery harvest in relation to complications are reported and compared with the postoperative 3-months' results. The postoperative wound problems of 155 patients who underwent coronary artery bypass grafting with radial artery harvesting were assessed using a questionnaire at 3 and 12 months after surgery. The questionnaire contained 9 statements concerning hand and forearm problems in daily life. The answers were graded in 7 levels. An answer of higher than grade 3 (mild symptoms) was regarded as a significant symptom. No hand ischemic complications was observed. In the 12 month-study, 152 patients (98.1%) were normal. Hand pain and numbness occurred in 25 patients (16.1 %) and 33 patients (21.3%), respectively, at 3 months and were markedly improved at 12 months (pain: 13 (8.4%), $p=0.045$, numbness: 20 (12.9%), $p=0.069$). Total scores for all questions also significantly decreased at 12 months (10.2 ± 3.5) compared with 3 months (11.1 ± 3.9) postoperatively (mean $\pm$ SD, $p=0.0003$). Radial artery harvest was quite acceptable from the patient's perception, although a few patients had numbness and pain in the 3 months after surgery. Those complications significantly improve in the later postoperative phase. (Circ J 2002; 66: 816–818)

Key Words: Coronary artery bypass grafting (CABG); Hand function; Radial artery

Recently, using the radial arteries (RA) for coronary artery bypass grafting (CABG) has gained renewed clinical interest. The procedure of RA harvesting has been reported to be successful with a low morbidity,¹ but the potential postoperative complications related to graft harvesting, such as injury of the sensory nerves or wound infection, may significantly affect the patient's quality of life.² Although there have been studies evaluating the risk factors for saphenous vein graft (SVG) harvest site complications, the rates of complications for RA harvest have not been well described.³ In particular, the patient's perception of postoperative hand function has not been reported in detail. In this study, we assessed the incidence of post-graft harvesting complications with questionnaires.

Methods

Between June 1996 and June 2000, 1,485 patients had CABG using RA the Austin & Repatriation Medical Centre. We prospectively assessed post harvest hand perception for patients without uncontrolled diabetes, peripheral vascular disease, severe obesity (body mass index of more than 35), positive sign of Allen's test, or poor left ventricular function (ejection fraction <35 %). In the present study, 155 patients undergoing one-sided RA harvesting were followed up for 12 months. We assessed the post-harvest forearm and hand perception using a questionnaire that contained 9 statements concerning hand and forearm problems in daily life

suffered postoperatively (Table 1). Before the operation, we informed the patients about the contents of the questionnaires and asked them to complete them and return by mail at 3 and 12 months after surgery. An answer of grade 3 (mild symptoms) or higher was regarded as a significant symptom. We compared the prevalence of those complications, and calculated the average score for each answer and the total score for questions between the postoperative 3- and 12-month results, respectively.

Harvesting Techniques

On the left side, RA harvesting was usually performed by a surgical assistant at the same time as a median sternotomy. On the right side, RA harvesting was followed by a median sternotomy. The RA harvest technique has been described elsewhere in detail.⁴ We employed a sharp harvesting technique with only scissors and hemoclips. We have never used either diathermy or Harmonic scalpel to cope with RA branches. After the removal of the grafts, the forearm was immobilized with bandages until the 2nd postoperative day.

Statistical Analysis

The results are expressed as mean and standard deviation (SD). Statistical differences between the groups tested were analyzed using the chi-square and Wilcoxon tests. Significance was defined as a p value of less than 0.05.

Results

None of the patients had post-RA-harvest hand ischemia. The prevalence of forearm and hand problems is shown in Table 2. In question 1, 150 (96.8%) patients answered 'yes', indicating that their hands were fine 3 months postoperatively (Table 2). In the postoperative 12th month, 152 (98.1%) patients said 'yes' (Table 2). In ques-

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Table 1 Post-harvest Hand Function Questionnaire

Questions relate to how you feel now. Postoperative 3 months results.

Q1. Right now, my hand and arm appear to be fine. Yes / No

With following questions from 2 to 11, indicate how strongly you agree or disagree right now with the statements by circling one of the levels (1 to 7).

Level; 1: not at all, 2: trivial, 3: mild, 4: moderate, 5: quite severe, 6: severe, 7: extreme

Q2. I feel pain in my arm or hand

Q3. I feel numbness in my arm or hand

Q4. My arm or hand is swollen

Q5. I have limited use of my hand

Q6. I am concerned about the appearance of my arm scar

Q7. My arm has a scar that causes discomfort

Q8. I have difficulties with daily tasks because of the use of my hand and arm

Q9. Overall, my life is affected by the problems with my hand or arm

Table 2 Incidence of Post-harvesting Hand Complications

	Postop. 3M	Postop. 12M	p value
Q1	150 (96.8%)	152 (98.1%)	0.7234
Q2	25 (16.1%)	13 (8.4%)	0.0557
Q3	33 (21.3%)	20 (12.9%)	0.0695
Q4	6 (3.9%)	3 (1.9%)	0.4987
Q5	9 (5.8%)	6 (3.9%)	0.5981
Q6	10 (6.5%)	3 (1.9%)	0.0855
Q7	10 (6.5%)	5 (3.2%)	0.2897
Q8	11 (7.1%)	2 (1.3%)	0.0234
Q9	6 (3.9%)	2 (1.3%)	0.2826

tions 2 and 3, which dealt with forearm pain and hand numbness, 25 patients (16.1%) and 33 patients (21.3%), respectively, complained of positive symptoms at postoperative 3 months (Table 2). These incidences markedly improved at postoperative 12 months (13 patients (8.4%), $p=0.05$, and 20 patients (12.9%), $p=0.07$, respectively) (Table 2). In questions 4–9, which dealt with swelling, limited use of hand, scar concern, scar discomfort, and affect on daily life, the prevalence of significant symptoms were indicated as 3.9–7.1 % (Table 2). These symptoms also improved by the postoperative 12th month (1.3–3.9 %) (Table 2). The average score for each question also decreased at postoperative 12 months compared with the 3-month score. In particular, there were significant differences in pain, scar concern and difficulty in use ($p=0.02$ – 0.04) (Fig 1). Total hand function score also significantly decreased at postoperative 12 months (3 months: 11.12 ± 3.91 vs 12 months: 10.27 ± 3.52 , $p=0.0003$) (Fig 1).

Discussion

The forearm and hand are visible and constantly used in daily life, so a forearm wound is likely to have a significant impact on daily activities. In this study, based upon questionnaire responses, we assessed the post RA harvest hand problems and compared the 3-month results with the postoperative 12 months results. We found several significant symptoms in the post RA harvest hand such as pain, numbness, swelling, hand limitations, difficulties using the hand in daily tasks, and life impact as the results of hand problems. In particular, the incidences of hand pain and numbness were considerably high, and the other symptoms also might be caused by the pain and numbness. In general, post RA harvest hand pain and numbness are considered to be

Fig 1. Comparison of 3- and 12-month results in terms of average score. * $p<0.05$.

the result of surgical trauma to the superficial branch of the radial nerve and are usually transient symptoms without any functional disturbance.⁵ We found that although the incidences of post harvest hand pain and numbness markedly decreased at postoperative 12 months, they were still present. We agree that these symptoms are probably caused by injury of the superficial branch of the radial nerve and although we have never used diathermy for the RA branches, we do use it to dissect subcutaneous tissue and fascia. We think that this part of the process of RA harvesting is the most dangerous for superficial nerve injury and thus we consider it important to use diathermy with the voltage as low as possible and to use it as little as possible.

It has been reported that post RA harvest scar tenderness or hypersensitivity is common.^{6,7} Tatoulis et al reported that post RA harvest scar complaints were indicated in 33% at 3 months postoperatively,⁸ and Royse et al reported that the prevalence of scar tenderness or hypersensitivity was 20% at 12 months postoperatively.⁶ Our results were slightly better; in particular, the incidences of hand pain and scar concern improved significantly at postoperative 12 months compared with 3 months. Furthermore, no hand ischemic complications and no motor deficit in the forearm were observed. Finally, 98.1 % of the patients had no problems with their hands at 12 months postoperatively.

Conclusions

Radial artery harvest is acceptable from the patient's perspective, but our study still indicates that some patients have symptoms in the forearm after RA harvest. These

symptoms improve in the postoperative later phase. Further long-term follow-up is necessary in relation to patients' hand function.

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