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TO STUDY THE COMPARISON OF SCAPHOID NONUNION TREATED BY VASCULARISED BONE GRAFT FROM DISTAL END OF RADIUS WITH THAT OF NON VASCULARISED BONE GRAFT FROM ILIAC CREST IN A MEDICAL COLLEGE HOSPITAL SETUP

Orthopaedics

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ABSTRACT

A prospective randomised study comparing radiographic results of 10 patients treated for scaphoid nonunion using a vascularised bone graft from the dorsum of distal radius (group I), relative to 10 patients treated by means of non vascularised bone graft from the iliac crest(group II).
Bone union was achieved in 7 of 10 patients group I and 4 of 10 group II patients. Functional results were good to excellent in 7 of the patients in group I and 6 in group II. Our study conclude that vascularised bone grafting yields superior results in scaphoid nonunion.

KEYWORDS

INTRODUCTION

Fracture of scaphoid is the most common among all carpal bones. Delayed diagnosis and precarious blood supply of scaphoid predisposes to delayed healing and non union. Scaphoid nonunion is associated with biomechanical changes and serious functional impairment involving the wrist. Bone union, relief of pain, and reestablishment of wrist function should be considered the primary goals of treatment. The usual treatment for scaphoid nonunion is conventional bone grafting, with or without bony fixation. Satisfactory bone union rates ranging from 80 to 90% have been reported by some authors [1]; but failure rates as high as 65% have been described by others [2, 3]. Most of these failures have been related to fractures of the proximal pole or avascular necrosis of the proximal fragment. Treating these challenging situations includes the use of vascularised bone grafts, as a more biological solution. Several types of grafting have been developed [4, 5, 6]; and, among these, local vascularised bone grafts near the wrist have gained the greatest popularity.

In 1991, when Zaidemberg et al. [7] first described a retrograde branch of the radial artery that feeds the distal dorsoradial part of the radius, and in 1995, when Sheetz et al. [8] published detailed descriptions of the vascular anatomy of the radius, several studies using the intercompartmental supraretinacular artery have demonstrated that satisfactory results can be achieved with this technique [9, 10]. However, other investigators [11] have questioned the efficacy of this approach, reporting low consolidation rates in patients with scaphoid nonunions with avascular necrosis of the proximal pole. Consequently, the primary objective of our study was to directly compare the clinical and radiographic findings of scaphoid nonunion treated using a vascularised bone graft from the distal radius, as proposed by Zaidemberg et al. [7], versus a conventional non-vascularised bone graft from iliac crest.

Patients and methods

For this study, we included 20 patients with scaphoid Nonunion who presented to orthopaedics OPD at Dr Ulhas Patil medical college and hospital Jalgoan Maharashtra. The study protocol had been submitted to and approved by the hospital's Committee for Ethics and Research 1 month prior to start of study. In the period from October 2015 to January 2018, patients presenting to OPD were randomized into one of two groups: group I consisted of 10 patients who underwent surgical repair involving a vascularised bone graft that was harvested from the dorsum of distal radius, as described by Zaidemberg et al. [7], and group II consisted of 10 patients who received a conventional nonvascularised iliac crest bone graft. All patients had under gone fixation with k-wire with was removed at 6 weeks. After taking prior Informed signed consent all patients with age between 18 to 60 yrs either sex were included in the study after randomization. Patients with history of prior surgery of either wrist of any kind were excluded from the study. None of the patients had undergone any previous surgical procedure of either wrist and patients otherwise were excluded if they had either previous wrist surgery. They were advised to stop smoking before and after surgery to achieve better union rate. All patients serial x rays were taken on follow up at 6 weeks ,12weeks, 4 and a half months, 6 months and 9 months. The views included posteroanterior with ulnar deviation, profile, lateral, and oblique.2 orthopaedic surgeon and 2 radiologists evaluated radiographs independently to identify when union had occurred. Patients were assessed clinically considering the parameters of pain, mobility functional improvement and overall satisfaction.

The sum of these evaluations was incorporated the following parameters: pain, functional state (time to return to work),range of motion, and patient global satisfaction. A final score was tabulated as the sum of the scores in the four categories, and this final score was further categorized either as excellent, good, moderate or poor, depending upon the total (see Table 1).

Table 1 Scaphoid outcome scores

Description		*SCORE*
Pain	No pain	3
	Occasional pain, no change in activity, mild discomfort with strenuous use	2
	Moderate pain, tolerable but some limitation in activities	1
	Severe pain, serious limitations in activities	0
Function	Back to usual work	3
	Back to usual work/sports with mild limitations	2
	Can perform most activities of daily living, but	
	cannot perform high-demand wrist activities	1
	Chronic pain limitation/discomfort	
Patients perception of Motion		
	Equal to opposite side	3
	Not equal to opposite side, but enough to perform usual activities	
	Enough motion for daily use, but some	2
	limitations in usual activities	1
	Stiff, not enough motion for daily use	0
Overall satisfaction		
	Very satisfied with surgical results	2
	Moderately satisfied with surgical results	1
	Not satisfied with surgical results	0
Maximum score		11
Results		
Excellent		10 or 11
Good		9 or 8
Fair		7 or 6
Poor		≤5

Postoperative evaluation

All 20 patients were immobilised in below elbow plaster cast including

the thumb for 6 weeks following which k wire removal was done and gradual mobilization was started

Nonunions were considered healed after radiographic evidence of bone consolidation (bridging trabeculae on both sides of the graft, with attenuation of the fracture lines in the scaphoid).

RESULTS

A statistically greater percentage of patients who received a vascularised graft achieved bony consolidation than did those who received a non-vascularised graft (70% versus 40%); Moreover, they did so over a shorter time interval at 12 weeks as compared to 4 and half month in group II. Outcome based on the patient's perception of function was measured by the scaphoid score (Table 1). Overall results were excellent in 3, good in 4, fair in 2, and poor in 1 (group I). For group II, results were excellent in 2, good in 4, fair in 3, and poor in 1

DISCUSSION

Treatment of scaphoid nonunion is demanding situation even in the hands of the best. Results depends on bone union, making the patient pain free, recovering wrist range of motion, and re-establishing normal biomechanical capabilities of the wrist [13]. When consolidation of the nonunion is not achieved, the results are generally poor, associated with persistent pain, progressive stiffness and degenerative changes. Vascularised bone grafts initially were developed in an attempt to improve consolidation rates obtained during surgical treatment of scaphoid nonunions. Better consolidation rates and earlier consolidation have since been achieved [7]. In another study, Waitayawinyu et al. [11] treated 30 consecutive patients with scaphoid nonunion and proximal pole AVN. The results of this investigation support the use of a vascularised bone graft for the treatment of scaphoid nonunions with avascular necrosis of the proximal pole.

In our study even after randomisation, the patients in our two groups were clinically very similar, the only real difference between them being the type of bone graft used. Outcomes included a summation score that incorporated pain, functional state, range of motion, and patient global satisfaction. Using this same scoring system, Steinmann et al. [14] achieved a good to excellent functional result in 64% of their patients. Using the same criteria, Samuel Ribak et al.[12] achieved a good to excellent functional result in 72% patients who had received a vascularised bone graft, but only in 57.4% of those who received a nonvascularised graft.

In our study, we achieved a good to excellent functional result in 70% patients who had received a vascularised bone graft, but only in 60% of those who received a nonvascularised graft. Patients who received vascularised grafts achieved bony consolidation within a mean of 12 weeks versus 4 and a half months with conventional grafting, and 70% in the former group achieved consolidation versus 40% in the latter, a statistically and clinically significant difference.

The use of vascularised bone grafting promoted bone healing and a consolidation rate. Radiographic and functional results allow us to conclude that the vascularised graft is superior to the conventionalnon-vascularised graft.

In conclusion, we suggest that vascularised bone grafting is better and should be done in view of better radiologiacal and clinical results.

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