Section A-Research paper
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"PATIENTS SATISFACTION AFTER TOTAL HIP REPLACEMENT IN AVASCULAR NECROSIS DUE TO SICKLE CELL DISEASE"

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Abstract

Introduction: Osteoarthritis secondary to osteonecrosis of the femoral head is a common presentation in patients with sickle cell disease. Functional limitations with or without deformities from these complications of sickle cell disease often require Total Hip Replacement to improve outcome. However, arthroplasty surgeons have been hesitant to perform replacements on individuals who are 30 years old due to concerns regarding potential medical complications, survivorship and the challenging inevitable revisions. We have conducted this study to understand the patients' satisfaction considering above complications and to assess the pain intensity of hip joint and health related quality of life as well as evaluate the duration of return to occupation/ activity of daily living post Total Hip Replacement.

Material & Method: Study was conducted in form of questionnaire for the patients operated with total hip replacement with sickle cell disease. Apart from personal details, Harris Hip score and Visual Analogue Scale were used in questionnaire to assess quality of life, return to occupation and pain level of patient respectively. Data was collected in pre tested, pre formed questionnaire along with basic personal details. The outcome measures were taken pre operatively and 6 weeks after surgery (post operatively) for comparison. After which the result of the study was evaluated using the data collected according to the Performa at stipulated duration.

Results: Out of 20 SCD patients, 9 developed avascular necrosis in 20-25 age group and 9 developed AVN in 26-30 age group.. Mean duration of illness in present study was found to be 19.2 months in which 45% patients were suffering for a duration of 1-2 years. Overall improvement was seen in the limp, and most of them having compliance and improvement in their gait. Walking ability was significantly improved in terms of support from 80% to 15% post operatively eliminating need for support among most of them. VAS score improved from a mean of 7.15 in pre-operative evaluation to 1.85 in post-operative evaluation and the Harris Hip score was improved from mean of 45.6 to 86.15 in post-operative evaluation. Majority of patients returned to their occupation within 6 weeks after surgery.

Conclusion: The study concludes that THR is an effective surgery in reducing pain intensity and improving quality of life in patients with avascular necrosis of hip due to sickle cell disease. The study also shows that limp was reduced post THR as well as patients required less walking support after surgery.

Keywords: Patient satisfaction, Avascular necrosis of hip, total hip replacement, osteonecrosis.

INTRODUCTION

Sickle cell disease (SCD) is an important etiology of hip osteonecrosis in the Indian subcontinent. SCD patients had a shorter life span and died before the bone changes were clinically apparent [1]. Osteoarthritis secondary to osteonecrosis of the femoral head is a common presentation in patients with sickle cell disease. Functional limitations with or without deformities from these complications of sickle cell disease often require Total Hip Replacement (THR) to improve outcome [2].

Avascular necrosis of femoral head in sickle cell disease is an immensely progressive and disabling complication in up to 20-50% of patients, majority of which are at their second to third decades. Young sickle cell patients with osteonecrosis of femoral head are greatly disabled due to pain and restricted motion. With increasing life span due to improved medical care, they ultimately need total hip replacement (THR) as most effective, reliable and dependable option. However, arthroplasty surgeons have been hesitant to perform replacements on individuals who are 30 years old due to concerns regarding potential medical complications, survivorship and the challenging inevitable revisions [3].

There are several fundamental differences between SCD patients who have a multi-organ disease and the typical case (osteoarthritis) requiring THA, making the prediction of postoperative outcomes difficult in the first group based on knowledge of the latter. The functional outcomes of total hip replacement (THR) on patients with congruous joints who underwent hip replacement after having a failed joint preservation surgery are unknown. With modern diagnosis and therapy, life expectancy has been increased and orthopaedic complications have therefore increased [4].

We have conducted this study to understand the patients' satisfaction considering above complications and to assess the pain intensity of hip joint and health related quality of life preoperatively and post operatively using VAS score and Harris Hip Score as well as evaluate the duration of return to occupation/ activity of daily living post THR.

MATERIALS & METHOD

Study Design: - Interventional study
Study Population: - Patients with Avascular Necrosis of hip with Sickle Cell Disease undergoing Total Hip Replacement surgery
Sample size: - All the operated patients of THR with SCD attending the Hospital during Data collection for a period of 6 months.

Inclusion criteria: -

- Patients with Avascular Necrosis of hip with Sickle Cell Disease undergoing Total Hip Replacement surgery
- Patients willing to participate in current study
- All patients participated till entire follow-up

Exclusion criteria: -

- Those who are not willing to participate
- Patients of AVN of hip undergoing THR surgery with causes other than SCD
- Patients with Avascular Necrosis of hip with Sickle Cell Disease having ongoing sickle cell crises
- Patients failed/lost to follow-up

Procedure

In this Interventional study, the main aim was to assess the impact of THR in SCD patient operated at our institution for assessment of pain and quality of life at immediate follow-up of 6 weeks after total hip arthroplasty. Apart from personal details, Harris Hip score and Visual Analogue Scale were used in questionnaire to assess quality of life, return to occupation and pain level of patient respectively. After ethical clearance, data was collected by personally interviewing every patient by Principal Investigator. All participants were explained in detailed about the study and written signed consent was taken. Data was collected in pre tested, pre formed questionnaire along with basic personal details.
Harris Hip Score (HHS) is a validated tool used to measure the functional capacity of a patient with hip pathology, before and after a surgical procedure. It's the most common scoring technique used traditionally for hip pathology. Visual analogue scale (VAS) is a psychometric scale that is generally used in hospitals and

clinics by doctors to conduct pain scale surveys to understand varying degrees of pain or discomfort experienced by a patient.

The outcome measures were taken pre operatively and 6 weeks after surgery (post operatively) for comparison. After which the result of the study was evaluated using the data collected according to the Performa at stipulated duration.

RESULT

Collected data has been compiled in Microsoft office Excel sheet. Descriptive and analytical statistical methods are used for the preparation of results. In analytical methods, paired t test is applied to find out significance level. Data has been presented in tabulated as well as graphical format.

Table 1: Descriptive analysis of patients undergoing THR

Demographic variables		**Frequency (n = 20)**	**Percentage**
Age	15 - 20	2	10.00%
	21 - 25	9	45.00%
	26 - 30	9	45.00%
Gender	Male	13	65.00%
	Female	7	35.00%
Occupation	Sedentary workers	11	55.00%
	Moderate workers	3	15.00%
	Strenuous workers	6	30.00%
Side affected	Right	12	60.00%
	Left	8	40.00%
Duration of illness	0 - 12 months	7	35.00%
	13 - 24 months	9	45.00%
	25 - 36 months	1	5.00%
	37 - 48 months	3	15.00%
Complication (post op)	Limb length discrepancy	4	20.00%
	Superficial infection	0	0.00%
	Deep infection	0	0.00%
	Implant loosening	0	0.00%
	Dislocation	0	0.00%
	None	16	80.00%
Return to occupation (post op)	Yes	18	90.00%
	No	2	10.00%

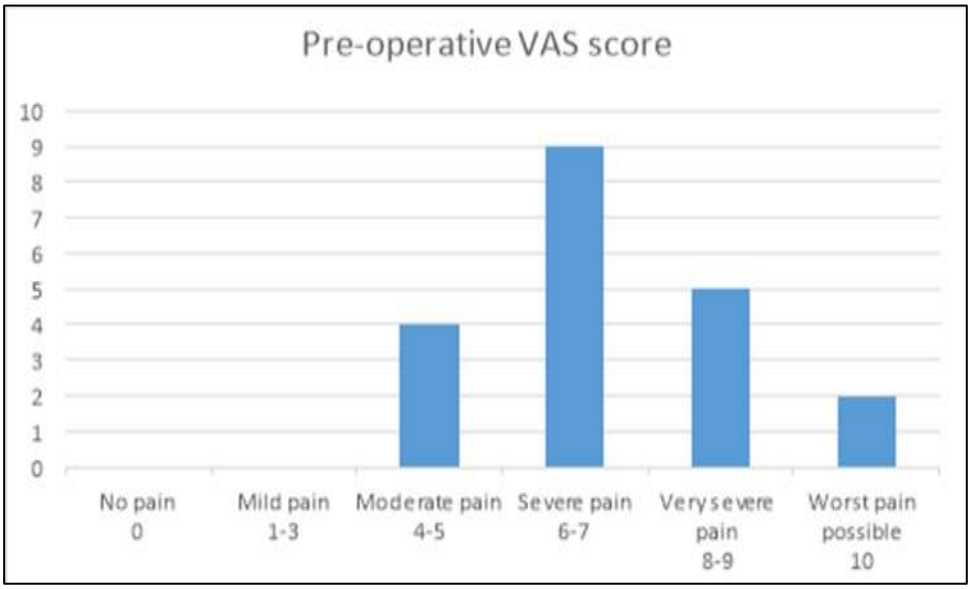

Figure 1: Pre-operative severity of VAS score with number of patients

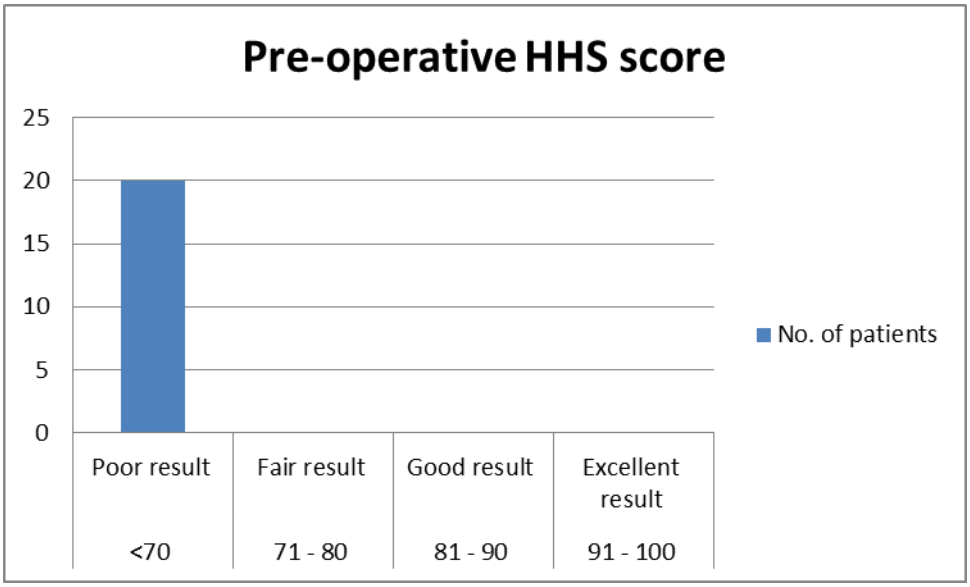

Figure 2: Pre- operative Distribution of Harris Hip Score

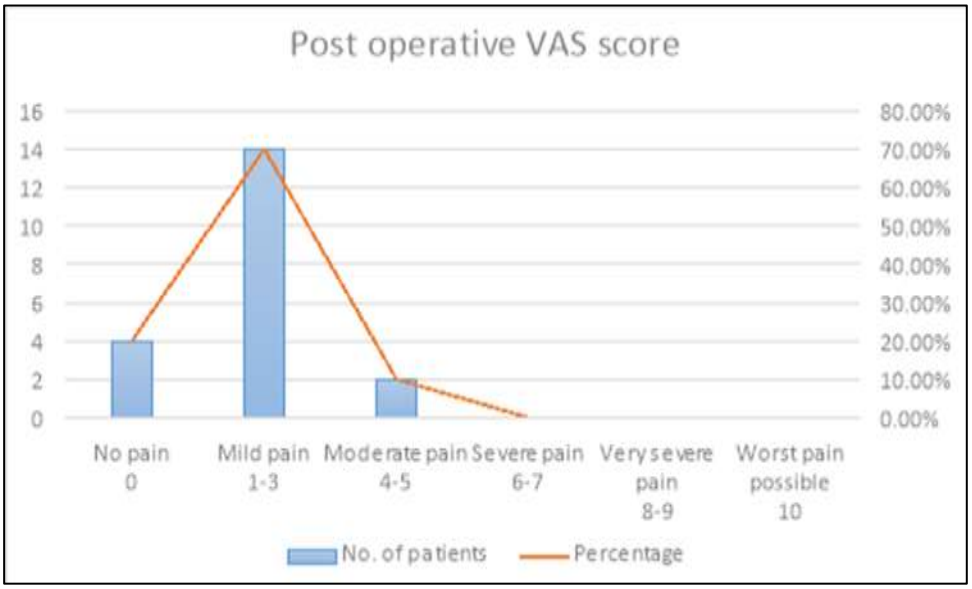

Figure 3: Post-operative severity of VAS score with number of patients

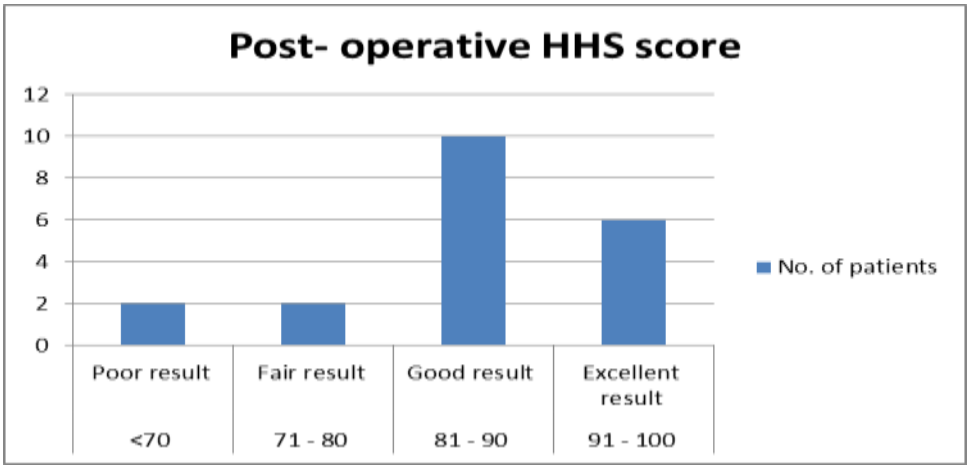

Figure 4: Post- operative Distribution of Harris Hip Score

Table 2: Comparison between Pre and Post THR in Outcome Measures using paired t test

Outcome Measure	Pre operative	Post operative	P value
	Mean (SD)	Mean (SD)	
VAS	7.15 (1.76)	1.85 (1.26)	**<0.00001***
HHS score	45.6 (8.09)	86.15 (11.32)	**<0.00001***

*P value <0.05 is considered statistical significant

Table 3: Improvement in Limp and walking support in percentage (%) post THR

Functions		No. of patients	
		Pre-operative	Post-operative
Limp	Present	18 (90%)	1 (5%)
	Absent	2 (10%)	19 (95%)
	Total	20 (100%)	20 (100%)
Walking support	Present	16 (80%)	3 (15%)
	Absent	4 (20%)	17 (85%)
	Total	20(100%)	20 (100%)

It shows 19 (95%) patients saw improvement in their gait 6 weeks after Total Hip Replacement surgery. And only 3 (15%) patients were using walking support in the follow up after 6 weeks.

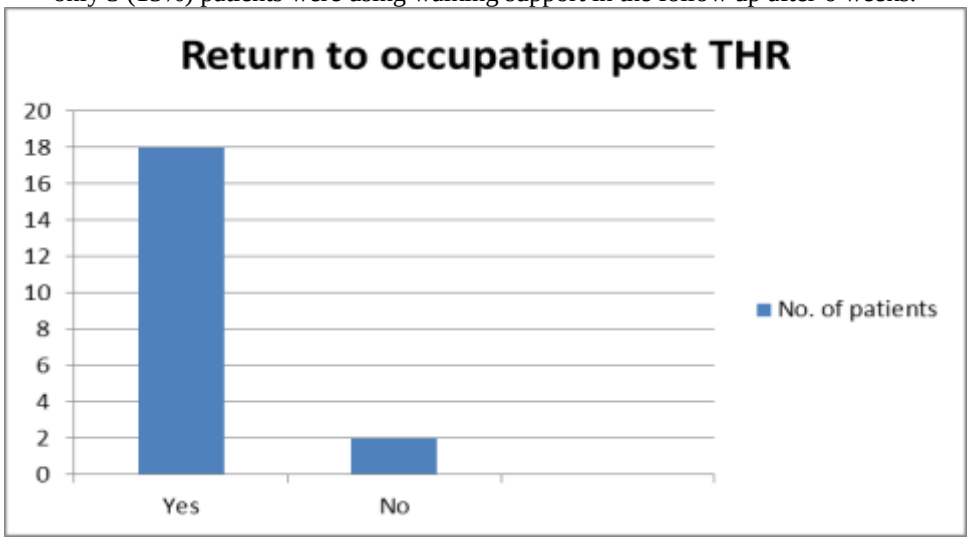

Figure 5: No. of patients returning to occupation post THR

Figure 5 shows 18 (90%) patients were satisfied and had returned to their occupation after their final follow up compared to their initial presentation. Only 2 (10%) patient were not able to return to their occupation.

DISCUSSION

Femoral head is the most typical site for avascular necrosis in sickle cell disease, followed by shoulder, knee, and other small joints. Avascular necrosis of the femoral head is a common presentation and it leads to osteoarthritis of the hip joint and affects its functional capacity. Treatment of osteonecrosis requires early diagnosis and timely intervention to prevent morbidity and mortality related to late diagnosis [(6)]. To improve functional capacity, the majority of orthopaedic surgeons recommend Total Hip Replacement (THR).

Regarding Demographics of the study, out of 20 SCD patients, 9 developed avascular necrosis in 20-25 age group and 9 developed AVN in 26-30 age group i.e. 90% cases were in third decade of life which is in accordance with study by Azam MQ et al [4]. In this study, primarily males are more affected (65%) as compared to females (35%) in contrast to study by Hernigou et al. [1]. Sedentary workers were found to be more affected (55%) than moderate and strenuous workers which was in contrast with the study conducted by Walter van der Weegen et al [8] which explained that a more liberal lifestyle restriction will lead to better resumption of activities and higher patient satisfaction. An increased number of cases with affection of right side (60%) than left side (40%) was observed. Mean duration of illness in present study was found to be 19.2 months in which 45% patients were suffering for a duration of 1-2 years. [Table 1]

Some patients report that osteonecrosis results in a greater reduction in their life-quality than the underlying cause [(1)]. After hip collapse, pain and reduction of function may be severe, warranting surgery. Initial options

include osteotomy or core decompression with or without bone grafting, total hip replacement but these are not always successful.
This patient population presents unique challenges in the perioperative period as they are at increased risk of medical and surgical complications [5]. Surgeons should be aware of the unique challenges in this patient population when counselling and managing these patients in the perioperative period. It has been observed in some studies that compared to non-SCD patients, SCD patients had increased stay in hospitals, 30-day and 90-day readmission rates, and rates of medical complications, including pain crises, acute chest syndrome, cardiac complications, sepsis, and mortality. SCD patients also had increased rates of surgical complications, including wound complications, infection, periprosthetic fracture, and aseptic loosening. Overall, THR revision rates were higher in SCD patients relative to those with primary osteoarthritis [(4)].

Rates of wound complications and infection may be a result of the compromised microvasculature and immune system of SCD patients, leading to delayed wound healing and a diminished capacity to prevent early wound contamination from progressing to periprosthetic joint infection. Therefore in current study, none of the patients were operated during sickle cell crises, rather operated minimally 3 months after crises. The authors believe that crises can lead to complications as discussed earlier and contribute to aggravating factor for post-operative complications. And this can also be the reason that current study had minimal complications. The higher rates of aseptic loosening are likely due to the fact that the average age of patients undergoing THA for SCD is significantly lower than the age of patients undergoing THA for primary OA [(7)].

Postoperatively, SCD patients should be placed in a closely monitored unit. The patient is ideally cared for in a tertiary hospital with an anesthesia team well-versed in the prevention and treatment of vaso-occlusive crises.

In this study, overall improvement was seen in the limp, where 90% patients had limp pre-operatively and most of them having compliance and improvement in their gait. Walking ability was significantly improved in terms of support from 80% to 15% post operatively eliminating need for support among most of them. Similar observation was shown by Alistair M Ewen et al [9] in a more comprehensive manner.

Post-operatively, in the follow up period, 20% patients were having complications of limb length discrepancy while rest of the patients had none of the complications which is in contrast to the study made by A.I. Stavrakis et al [7] where patients undergoing THR have increased rates of sepsis. In this study no cases of sepsis or any other type infection was noted within the described follow-up period.

The activity of daily living and return to occupation was achieved among 90% of the operated patients whereas 10% patients were not able to continue their occupation at the end of the follow up, which was due to approach related restrictions which require squatting or cross-legged seating.

In this interventional study, significant overall improvement in quality of life was observed on assessments using VAS score and Harris Hip score. VAS score improved from a mean of 7.15 in pre-operative evaluation to 1.85 in post-operative evaluation whereas in the study conducted by Azam MQ et al [4] improvement was seen from average of 7 in pre-operative to 3 in post-operative evaluation showing that in present study, before surgery, where patients were experiencing severe pain on average, this was significantly improved and after 6 weeks, these patients were having no pain to mild pain. Similarly, the Harris Hip score was improved from mean of 45.6 to 86.15 in post-operative evaluation which is in accordance with study conducted by Azam MQ et al [4]. This also shows that the functioning of the hip joint was improved after the THR from an average of poor result to a good result.

Limitations
Due to low number of cases and small follow up period many of the long term effects of THR in SCD are not yet accurately known.

CONCLUSION
The study concludes that THR is an effective surgery in reducing pain intensity and improving quality of life in patients with avascular necrosis of hip due to sickle cell disease.
The study also shows that limp was reduced post THR as well as patients required less walking support after surgery. Majority of patients returned to their occupation within 6 weeks after surgery. This indicates that patients with SCD who has high risk of developing post-operative complications can undergo THR surgery to opt better results.

Recommendation

Results obtained from this study will encourage patients with avascular necrosis due to sickle cell anaemia to take decision of undergoing total hip replacement surgery.

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