

Effect of Applying Postoperative Nursing Instructions On Ankle Open Reduction Internal Fixation Surgery Patients.

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Abstract

Background: Fractures of the ankle are one of the most common lesions the orthopedic surgeon handles. **Aim:** to evaluate the effect of applying postoperative nursing instructions on ankle open reduction internal fixation (ORIF) surgery patients. **Research design:** Quasi experimental research design was utilized in this study. **Setting:** This study was performed in trauma units (male and female) and orthopedic clinic at Assiut University Hospital. **Sample:** This study included a convenient sample of (60 patients). **Tool I:** Interview questionnaire sheet **Tool II:** Patient complications assessment sheet. **Results:** In lateral wound ,it was found that one quarter of control group had normal healing while more than two fifth in study group . In medial wound healing it was found that more than one third of control group had normal healing while majority in study group. **Conclusion:** The present study revealed that providing patients with post-operative nursing instructions were represented of great value in wound healing and reduction other complications (residual pain, Malunion, infection, deformity). **Recommendations:** the present study should be replicated on larger study populations for generalization of the results.

Keywords: Ankle Fractures, Internal Fixation Surgery & Nursing Instructions.

Introduction

The ankle joint is the fusion of three bony structures. Those are the talus tibia distal ends, the fibula and the talus trochlea. In the ankle joint fork, the tibia and fibula are elastically connected by the syndesmosse ligament structures (interosseous membrane; anterior, posterior, and transverse tibiofibular ligaments) (Todd, 2015).

Ankle fractures, varying in severity from stable lateral malleolus fractures to open fracture dislocations with comminution, are the most common fractures requiring surgical treatment (Mikko, 2016). Ankle fractures are increasingly common injuries that necessitate a careful approach for proper management. More than five million ankle injuries happen annually in the United States (Van den berg et al., 2018).

Ankle fractures are among the most common lower limb fractures which account for 10% of all fractures, representing a significant portion of the trauma workload. Nevertheless, usually affect young men and older women below 50 years of age; ankle fractures are the commonest in men. After this age, females become predominant (Juto, 2018).

Twisting lesions and falls are the most common causes of ankle fractures, followed by sports injuries. Alcohol and slippery surfaces are involved in almost a third of each case (Unnithan & Thomas, 2018).

Surgical treatment means reduction if the fractured parts are displaced and fixed using different devices such as metal plates, screws, tension bands or

external trying to fix. These operating techniques aim at restoring anatomy and ensuring immediate stabilization, which promotes earlier mobilization (David, 2019).

The timing of effective surgical treatment depends largely on the soft tissue findings. Immediate definite surgery is possible only with highly fragile soft tissues. Surgery should be postponed in all other situations until inflammation around the joint has subsided, and wrinkles in the skin have reappeared. When surgery is carried out while the soft tissue is still swollen, this may be technical impossible to close the wound without excessive tension. (David & Naomi, 2019)

Several complications may accompany surgical treatment of ankle fractures the overall complication rate following ankle fractures ORIF The literature varies considerably from 1% to 40%. Postoperative guidance may reduce the incidence of surgical complications. Complications of postoperative wounds are the most common problems, of which deep infection the may have the most devastating consequences (Macera et al., 2018).

The most common complications following ankle fracture surgery are infection with the surgical site (SSI). The incidence of SSI following operative treatment of ankle fractures ranging from 1.4% to 5.5%, and infection rates as high as 19% have been reported in diabetic patients (Sun et al., 2018).

Certain documented complications include deficient primary osteosynthesis, soft tissue necrosis, inflammation, osteitis, DVT, delayed union, nonunion, secondary displacement, refracture, stiffness, muscle atrophy, tendinal insufficiency, sensory impairment, tarsal tunnel syndrome and Type 1 complex regional pain syndrome type 1 (Mehta et al., 2014).

Post-operative nursing instructions is a major factor in the success of surgery as well as reducing the incidence of complications after surgery. Patients are taught a home nursing guidelines for each component. (Nursing Alliance for Quality of Care, 2013).

Significance of the study

Ankle joint fractures are among the most common adult fractures with an occurrence of up to 187 cases per 100 000 people per year (Kortekangas et al., 2019). During the year 2019, 135 cases were reported and diagnosed as ankle fracture, according to trauma unit records at Assiut University Hospital

Operational definition

- Nursing instructions: It refers to the advices or teaching and guidance that are provided by the professional nurse and must be followed by the patient regarding improving knowledge
- Ankle Open Reduction Internal Fixation Surgery: is a type of surgery used to stabilize and heal a broken bone. It used to treat broken ankle.

Aim of the study

The research aimed to evaluate the effect of applying postoperative nursing instructions on ankle open reduction internal fixation surgery patients.

Hypothesis

The ankle open reduction internal fixation surgery patients will be improved after applying post-operative nursing instructions.

Subjects & Method

Research design

This study utilized quasi experimental research design.

Setting:

The study was conducted in trauma units and orthopedic clinic at Assiut University Hospital

Subjects

A convenient sample of 60 adult patients (male and female), undergoing surgery (ORIF). Their ages varied between eighteen and sixty. The patients split into two equivalent study and control) the study group received the postoperative nursing instructions and control group received routine hospital care.

Sample size

The power analysis to estimate the sample size was performed based on the result of previous study. Assuming power of 0.80% and 0.05 (one sided

equivalence test). A total sample size of 56 participants is required. The patients were invited to participate after the assessment, they meet all of the inclusion criteria $n = 60$

Study tools:

Tool I: Interview questionnaire sheet: designed by the researcher based on current national and international literature, and composed of two parts:

Part (1): Patient demographics: it includes age, gender, marital status, educational level and occupation.

Part (2): Assessment of Patient's history of trauma: it includes causes of fracture, date of fracture, date of surgery, patient's diagnosis, involved side and chronic diseases.

Tool II: Assessment sheet for patient complications: The following parts were included

1. Skin and Neurovascular status of affected limb
2. Wound assessment scale scoring system for the lateral and medial wound site (Pudner, 2005). The wound was classified into one of four groups after 10-14 days of postoperative surgery: usual healing, minor complications, wound infection and major hematoma

Scoring system

With regard to the assessment of wound site infection, each item was detected, graded and rated to be present or not present on all items for study and control groups

3. Other complications that included Residual pain, Malunion, Deformity, Infection, deep venous thrombosis (DVT) and bleeding

Postoperative Nursing Instructions: It was prepared by the researchers based on reviewing recent literature and opinion of the medical and nursing expertise. It was designed in a simplified Arabic language and was supported by photo illustrations and colored pictures. It consists of the following:

- A. Simple information about ankle fracture (definition, causes, signs and symptoms, conservative and surgical treatment) of ankle fracture.
- B. Post-operative and follow up visits instructions.
 - 1- Swelling and pain reduction method.
 - 2- Proper Nutrition.
 - 3- Nausea and vomiting.
 - 4- Wound care.
 - 5- Car driving.
 - 6- Medications.
 - 7- Warning signs and symptoms of complications.
 - 8- Postoperative follow up
 - 9- How to use cane.
 - 10- Physical exercises.
 - Ankle Range of Motion
 - Shallow standing knee bends
 - Straight leg raises
 - Heel raises

Method

Ethical considerations

The study was affirmed by ethics committee of faculty of nursing and from the hospital authorities of trauma units and outpatients clinics of orthopedic; a composed endorsement was gotten from the enlisted patients to take part within the study after clarifying the nature and reason of the study. The researcher explained that participation is voluntary, and that the status of patient involvement will not influence the treatment they will receive. The patients were allowed to refuse to take part in the research and can withdraw at any time.

Procedure

The study was performed in three phases

Preparatory phase

Tools development: A review of current and past, local and international related literature. Books, journals, periodicals and magazines were used in various aspects.

Content validity and reliability

It was established by a panel of five experts (three experts from Medical Surgical Nursing staff and two Orthopedic Surgery staff) who reviewed the tool for clarity, relevance, comprehensivity, understanding and applicability. Minor modifications were required. Contents reliability of the proposed tools was ascertained with Cronbach's $\alpha = 0.82$

Pilot Study

A pilot study was conducted during January 2019, on 10% of patients who were included within the research to examine clarity, applicability and feasibility of the used tools; those patients were included in the main study as there was no modification needed in the study tool.

Implementation Phase

- At initial interview the researchers introduce themselves to initiate line of communication, explain the nature & purpose of the study and fill out Interview questionnaire sheet (**tool I**).
- The researcher met each patient individually and described the study and its goals to the patient
- Postoperative nursing instructions had been implemented for patients with ankle open reduction internal fixation surgery.
- For the study group; after filling the Interview questionnaire sheet, the researcher explained to the patient the nursing instructions postoperatively in the following sequence:
 - The postoperative nursing instructions were administered to the patient in two sessions; the duration of each session was about half hour, including 15 minutes for discussion and feedback.
 - The researchers in the first session explained to the patients simple information about ankle fracture (definition ,causes, signs and symptoms,

conservative and surgical treatment) of ankle fracture

- Second session was specified for the postoperative nursing instructions and exercises which were demonstrated by the researcher to the patients.
- Copy of the postoperative nursing instructions was provided for each patient in the study group.
- For control group they received routine hospital postoperative instructions.
- The researchers arranged with the patients the time and place for follow up which were after two weeks and four months in the out patients clinic of orthopaedic at Assiut University Hospital
- This study was carried out through the period from February 2019 to July 2019 at morning shift

Evaluation phase

Upon the patient's discharge from the hospital, the researcher approached the patient for follow-up in an outpatient orthopaedic clinic (during his / her first visit 2 weeks after the surgery and 4 months after the surgery) to re-evaluate the condition of the patient, this is for the members of the control and study group by using **Tool II**.

Statistical analysis

The data were verified for normality using the Anderson-Darling test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by number and percent (N, %), where continuous variables described by mean and standard deviation (Mean, SD). Chi-square test and fisher exact test used to compare between categorical variables where compare between continuous variables by t-test. A two-tailed $p < 0.05$ was considered statistically significant. All analyses were performed with the IBM SPSS 20.0 software.

Results**Table (1): Distribution of studied sample (both control and study groups) as regarding to their demographic characteristics.**

	Control(n=30)		Study(n=30)		P. value
	N.	%	N.	%	
Age group					
Less than 30 year	11	36.7	5	16.7	0.197
from 30-40 years	4	13.3	4	13.3	
more than 40 year	15	50.0	21	70.0	
Mean±SD	41.10±16.7		47.67±3.04		0.085
Gender					
Male	26	86.7	22	73.3	0.197
Female	4	13.3	8	26.7	
Marital Status					
Single	6	20.0	2	6.7	0.148
Married	21	70.0	25	83.3	
Divorced	0	0.0	2	6.7	
Widow or Widower	3	10.0	1	3.3	
Level of education					
High education	1	3.3	1	3.3	0.342
Secondary education	8	26.7	8	26.7	
Read and write	5	16.7	6	20.0	
Illiterate	14	46.7	8	26.7	
Primary education	2	6.7	7	23.3	
Occupation					
Employee	8	26.7	4	13.3	0.231
Student	2	6.7	0	0.0	
Farmer	15	50.0	18	60.0	
House wife	5	16.7	8	26.7	

Chi-Square Tests Ns= Non significant difference P>0.05

Table (2): Distribution of studied sample (both control and study groups) as regarding to medical data.

	Control(n=30)		Study(n=30)		P. value
	N.	%	N.	%	
Causes					
Falls	14	46.7	16	53.3	0.606
Accident	16	53.3	14	46.7	
Affected Side					
Right	16	53.3	8	26.7	0.022*
Left	12	40.0	22	73.3	
Right and left	2	6.7	0	0.0	
Chronic diseases					
Diabetes Mellitus	3	10.0	4	13.3	0.688
Hypertension	0	0.0	9	30.0	0.001**
Cardiovascular disease	0	0.0	2	6.7	0.150
Pulmonary disease	0	0.0	0	0.0	-
Kidney disease	0	0.0	0	0.0	-
Endocrine disease	0	0.0	0	0.0	-
Tumors disease	0	0.0	0	0.0	-
Color					
Pale	9	30.0	14	46.7	0.009**
Cyanosed	8	26.7	0	0.0	
Normal	13	43.3	16	53.3	
Skin temperature					
Hot	17	56.7	0	0.0	<0.001**
Warm	13	43.3	28	93.3	
Swelling					
Marked	5	16.7	2	6.7	0.349
Moderate	21	70.0	21	70.0	
Nile	4	13.3	7	23.3	
Pulse					
Absent	3	10.0	0	0.0	0.029*
Weak	25	83.3	20	66.7	
Strong	2	6.7	8	26.7	
Capillary refill					
Early	9	30.0	24	80.0	<0.001**
Delayed	21	70.0	6	20.0	
Neurostatus					
Paralysis	3	10.0	0	0.0	<0.001**
Pain	27	90.0	14	46.7	
Parasthesia	0	0.0	16	53.3	

Chi-Square Tests *statistically significant difference at P. value <0.05, **statistically significant difference at P. value <0.01

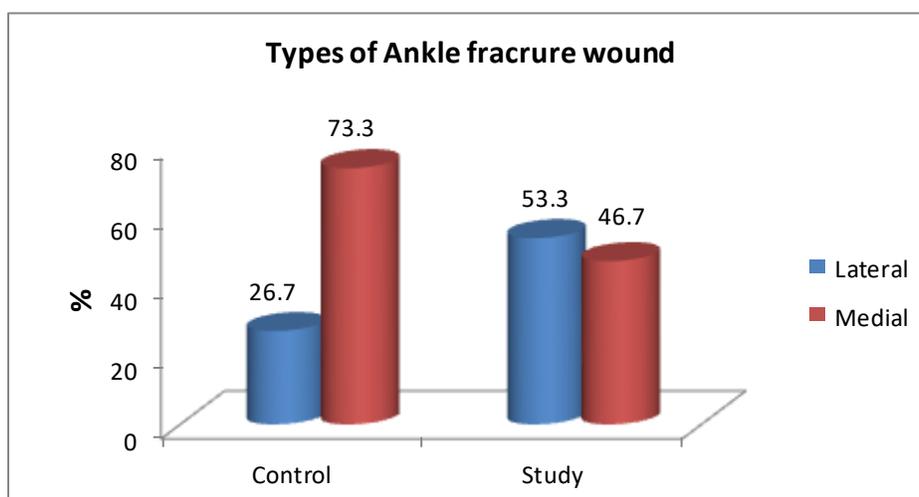


Figure (1): Percentages distribution of both groups (control and study group) according to type of ankle fracture wound.

Table (3): Comparison between Study and Control group as regard wound assessment scale and other complications.

	Lateral wound				P. value	Medial Wound				P. value
	Control (n=8)		Study (n=16)			Control (n=22)		Study (n=14)		
	N.	%	N.	%		N.	%	N.	%	
Grade and Appearance					0.092					0.020*
Normal healing	2	25.0	7	43.8		8	36.4	12	85.7	
Erythema plus others signs of inflammation	4	50.0	4	25.0		5	22.7	2	14.3	
clear or heamoserous discharge	0	0.0	3	18.8		2	9.1	0	0.0	
Major complication pus	0	0.0	2	12.5		7	31.8	0	0.0	
Erythema plus others signs of inflammation clear or heamoserous discharge	2	25.0	0	0.0		0	0.0	0	0.0	
Some bruising	-	-	-	-	-	-	-	-	-	-
Considerable bruising	-	-	-	-	-	-	-	-	-	-
Mild erythema	-	-	-	-	-	-	-	-	-	-
At one point	-	-	-	-	-	2	9.1	0	0.0	0.246
Around Suture	-	-	-	-	-	-	-	-	-	-
Along wound	4	50.0	2	12.5	0.046*	5	22.7	1	7.1	0.440
Around wound	6	75.0	2	12.5	0.002**	6	27.3	0	0.0	0.032*
At one Point only (<2cm)	5	62.5	3	18.8	0.032*	2	9.1	0	0.0	0.246
Along wound(>2cm)	-	-	-	-	-	-	-	-	-	-
large Volume	-	-	-	-	-	-	-	-	-	-
Prolonged (>3 days)	-	-	-	-	-	-	-	-	-	-
At one pints(<2 cm)	0	0.0	2	12.5	0.296	3	13.6	0	0.0	0.149
Along wound (>2cm)	-	-	-	-	-	4	18.2	0	0.0	0.091
Along wound	-	-	-	-	-	-	-	-	-	-
Other complication					0.078					0.035*
Residual Pain	8	100	4	67		10	45.5	9	64.3	
Malunion	0	0.0	2	33		2	9.1	0	0.0	
Deformity	0	0.0	0	0.0		4	18.2	0	0.0	
Infection	0	0.0	0	0.0		7	31.8	0	0.0	

Chi-Square Tests *statistically significant difference at P. value <0.05

Table (4): Relation between Types of ankle fracture wound and demographic data for Study and Control group.

Demographic data	Control group				P. value	Study group				P. value
	Lateral		Medial			Lateral		Medial		
	N.	%	N.	%		N.	%	N.	%	
Age group										
Less than 30 year	2	25.0	9	40.9	0.468	3	18.8	2	14.3	0.944
from 30-40 years	2	25.0	2	9.1		2	12.5	2	14.3	
more than 40 year	4	50.0	11	50.0		11	68.8	10	71.4	
Gender										
Male	7	87.5	19	86.4	0.935	14	87.5	8	57.1	0.061
Female	1	12.5	3	13.6		2	12.5	6	42.9	
Marital Status										
Single	2	25.0	4	18.2	0.531	2	12.5	0	0.0	0.177
Married	6	75.0	15	68.2		13	81.3	12	85.7	
Divorced	0	0.0	0	0.0		0	0.0	2	14.3	
Widow or Widower	0	0.0	3	13.6		1	6.3	0	0.0	
Level of education										
High education	1	12.5	0	0.0	0.311	0	0.0	1	7.1	0.184
Secondary education	1	12.5	7	31.8		5	31.3	3	21.4	
Read and write	2	25.0	3	13.6		1	6.3	5	35.7	
Illiterate	4	50.0	10	45.5		6	37.5	2	14.3	
Primary education	0	0.0	2	9.1		4	25.0	3	21.4	
Occupation										
Employee	4	50.0	4	18.2	0.189	0	0.0	4	28.6	0.003
Student	0	0.0	2	9.1		0	0.0	0	0.0	
Farmer	4	50.0	11	50.0		14	87.5	4	28.6	
House wife	0	0.0	5	22.7		2	12.5	6	42.9	

Chi-Square Tests *statistically significant difference at $P. value < 0.05$, **statistically significant difference at $P. value < 0.01$

Table (1): Shows that half of control group (50%) their age more than 40 years compared to (70%) in the study group . regarding to gender , it was found that majority of control group (86.7%) were male compared to (73.3%) in study group . it was found that the highest percentages in both groups (study and control) were married and farmer. Regarding education, it was found that more than one quarter (26.7%) in both groups were secondary education.

Table (2): As regard causes of ankle fracture, it was found that more than half (53.3%) of control group had accident while more than half (53.3%) of study group had falls. As regard affected side, it was found that more than half (53.3%) of control group their affected side was right and more than two third (73.3%) of study group was left side. Regarding chronic diseases (30%) of study group had hypertension while (10%) of control group had diabetes. As regard neurostatus, it was found vast majority of control group (90%) had pain compared to more than two fifth (46.7%) in study group.

Figure (1): Showed that more than two third (73.3%) of control group had medial ankle fracture compared to more than two fifth (46.7%) in study group.

Table (3): Shows that in lateral wound ,it was found that one quarter (25%) of control group had normal healing and more than two fifth (46.8%) in study group . regarding other complications , it was found that 8 patients of control group had residual pain and 4 patients in study group. In medial wound healing it was found that more than one third (36.4%) of control group had normal healing while majority (85.7%) in study group. As regard other complications, it was found that 10 patients of control group had residual pain and 9 patients in study group. There was 7 patients from control group had infection, 4patients had deformity and 2 had Malunion. There was statistically significant difference between study and control in ankle fracture medial wound.

Table (4): Shows no significant difference between ankle fracture wound type and demographic data for both groups.

Discussion

Ankle fractures are one of the more commonly occurring forms of trauma managed by orthopedic teams worldwide. The impacts of these injuries are not restricted to pain and disability caused at the time of the injury but the long-term consequences may also be physical, psychological and social **McLean et al., (2013)**.

Open reduction and internal fixation (ORIF) represents the gold standard for the treatment of ankle fractures to restore anatomical alignment and articular congruity of ankle mortise to avoid altered loading of the tibiotalar joint and subsequent poor functional outcomes **Armando et al., (2018)**)

Part 1: Demographic and medical data

Demographic characteristics like age, gender, occupation has imperative part in causation of ankle fractures which may indeed influence their recuperation after the surgery. Regarding to age the current study revealed that, more than one third of the sample was more than 40 years old, this result in agreement with **Armando et al., (2018)**) they expressed that majority of research sample mean aged was 47.2years. In the same line **Robiaetal., (2017)** found that mean age of the participants was 50 years in their study. **Korim et al., (2014)** state that a mean age of studied sample were 42.4 years , also **Loretta et al., (2018)**) state that the average age was 41 years.

According to gender the current study refers to, the majority of the study was males, More over **Armando et al., (2018)** & **Korim et al., (2014)** stated that the majority of their study was male. The result negated with **Black et al., (2013)** who mention that ankle fractures are more frequent among females, Females generally have an increased incidence during their life, mainly between the ages of 30 and 60, high prevalence of low-energy trauma among women, and increased incidence of osteoporotic fractures with age. Another way this result contradicted the results by **Robiaetal., (2017)** who reported that; more than half of their study was female.

Regarding education, it was found that more than one quarter (26.7%) in both groups were secondary education **Robiaet al., (2017)** found lower education were common. **Songet al., (2018)** found primary education were common. The study results revealed that highest percentages in both groups (study and control) were married and farmer. **Linnet al., (2012)** agreed with these findings that the majority of study sample were manual worker.

Based on the result of the current study, regarding to causes of ankle fracture, it was found that more than half of control group had accident while more than half of study group had falls, **Juto et al., (2018)** demonstrated that ankle fractures caused by

traffic accident, fall from heights, and crushing injury. **McLean et al., (2013)** revealed that most common causes of ankle fracture were bike accident, fall and twisting motion. **Sun et al., (2018)** & **Stäbler et al., (2012)** stated that the majority of ankle fractures were caused by low-energy injury. In this study the low-energy trauma was described as a fall from a standing height or less, with an eventual physical activity not more than walking. The remaining fractures, including sports injuries and falls down stairs, were defined as non-low-energy trauma.

The findings of the current study revealed that more than half of control group their affected side was right and more than two third of study group was left side. **Bugler et al., (2012)** stated that Left side was commonly affected in their study, while **Steven et al., (2012)** found the right ankle was common.

Regarding chronic diseases. Less than one third of study group had hypertension. **Peteret al., (2009)** revealed that hypertension seem to be the major cardiovascular risk factor for fractures.

As regard neurovascular assessment, it was found that the highest percentages in both groups normal color, moderate swelling. Weak pulse, warm temperature, more than one quarter of control group have early capillary refill compared to majority in study group, vast majority of control group had pain compared to more than two fifth in study group. These results agreed with. **Stein et al., (2012)**. Postoperative pain is associated with extended post-anesthesia care unit stay in the ambulatory surgery patients; an increased rate of unanticipated admission or readmission after surgery, and increased cost. **McLean et al., (2013)** stated that a broad range of physical impacts were described by both patients and health professionals. These impacts included mechanical elements (swelling, reduced muscle strength, decreased range of motion) and associated afferent impacts (pain, discomfort, altered sensation). Pain was the main complain reported by patients.

Regarding type of ankle fracture wound more than two third of control group had medial ankle fracture compared to more than two fifth in study group, another way this result contradicted the results by **Loretta et al., (2018)**) who stated that isolated lateral malleolus fractures was the commonest fracture .In the same line **Armando et al., (2018)**) found that Bimalleolar fractures were the most frequent ankle fracture followed by isolated medial and isolated lateral fractures, **Polzer et al., (2012)** The majority of patients reported having lateral fractures.

Regarding other complications, it was found that most complications were residual pain followed by infection, deformity and Malunion **Armando (2018)** stated that most common postoperative complication in their study were residual pain, infection and

wound dehiscence are common postoperative complications of ankle fracture. **Ovaska** , (2015) Explained that postoperative residual ankle pain is also often associated with chondral damage and soft tissue impingement, as well as posttraumatic neuromas, arthrofibrosis, malunion, loss of reduction, and Malunion. **Jun & Xuecheng**, (2017) stated that the number of patients with wound complications is also increasing. It was reported that the incidence rate of wound infections is from 5% to 25. For patients who are diagnosed with superficial infections, a good outcome can be achieved after active treatment. However, it is devastating to patients who are diagnosed with deep infections.

In the same line **Zalavras et al.**, (2009) added that infection is a recognized complication in the operative management of ankle fracture. The rate of deep infection in patients undergoing ORIF of AF ranges from 1% to 8% predisposing factors include advanced age, high energy injuries, smoking, diabetes, open fractures, compromised soft tissue envelope and alcoholism.

Regarding relation between types of ankle fracture wound and demographic data this study illustrated that there was no significant difference between type of ankle fracture wound and demographic data **Taweel et al.**, (2013) revealed that no relation between the classes of ankle fractures, age and gender as well as the energy involved in the trauma.

Conclusion

The present study revealed that providing patients with a guide detailed instructions for patient with ankle open reduction internal fixation surgery was represented of great value in wound healing and reduction other complications (residual pain, Malunion, infection, deformity).

Recommendation

Providing copy of the nursing instructions for patients with ankle open reduction internal fixation surgery in the trauma units and out patients' clinic of orthopedic to be readily available for all patients with ankle fracture, the present study should be replicated on larger study populations for generalization of the results.

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