

Patient-dependent factors for fractures union failure among Riyadh population 2016

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ABSTRACT

Background: The primary care has an important role to prevent fractures and make sure of complete healing without any complications like a Malunion which arises when a fracture has healed in a non-anatomical position, and a delayed union which defined as a healing time of more than 12 weeks and a non-union which occurs when absence of fracture healing progression on series of radiographs or with no evidence of healing over 10 weeks. **Objectives:** To identify the proportion of fracture healing failure types and identify Patient-dependent Factors. **Methodology:** cross sectional study consecutive sampling till completing sample size (90) patients. Data collection tool was Pretested Pre-Coded self-administered questionnaire it was subjected to a probe to test for validity and reliability. Data analyzed Using SPSS *P* value of less than 0.05 considered as significant results. Chi-square test was the test of significance. **Results:** From 90 adult male participants, 71% were 35 years of age and above and below 55 years. Our result indicated that the commonest risk factor was smoking in 62.2% of respondents, and 27.8% have Diabetes mellitus. 50% of fractures failure was diagnosed as delayed union while non-union accounts for 40% and malunion for 10%. We've noticed that smokers mostly had delayed union, while diabetic patients had mostly non-union. **Conclusion:** the study found that the most associating Patient-dependent Factors were cigarettes smoking and Diabetes mellitus, also most fractures failure were diagnosed as delayed union, non-union, and malunion respectively and we can help prevent these complications by controlling DM and stop cigarettes smoking.

Keywords: Fracture healing failure, delayed union, non-union

Introduction

Background

Bone healing is a complicated but well-orchestrated physiological process that summarizes aspects of embryonic skeletal development in combination with normal reaction to acute tissue injury it starts with hematoma formation followed by inflammation, repair, and finally, remodeling which is controlled by the complicated interaction of circulating

GH, insulin-like growth factors (IGFs), IGF-binding proteins (IGFBPs), locally produced IGFs, IGFBPs and other growth factors.^[1-3]

A Malunion happens when a fracture has healed in a non-anatomical position, the lower limb usually has functional limitation, and in the upper limb malunion there are often more cosmetic problems than functional ones. In adults, a delayed union is defined as a healing time exceeding 12 weeks and non-union was defined as an absence of fracture healing progression on consecutive radiographs or no evidence of healing over 10 weeks after the injury, atrophic non-union has been attributed to failure of healing biology like inadequate

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Received: 22-06-2020

Revised: 05-09-2020

Accepted: 20-11-2020

Published: 31-12-2020

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_1231_20

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How to cite this article: Aldhafian M, Alotaibi F, Alzahrani A, Almajid H, Alamri A, Aljandal A, *et al.* Patient-dependent factors for fractures union failure among Riyadh population 2016. J Family Med Prim Care 2020;9:6224-7.

vascularity, while hypertrophic non-unions are reported to occur in the presence of excessive movement or infection.^[4,5]

It has been estimated that 5-10 percent of all types of bone fractures lead to bone healing problems. which raise up a challenge for surgeon, To keep these events from happening, it is crucial to investigate and highlight the causative factors of this matter, nonunion cases could be as an outcome of patient-dependent factors, patient-independent factors, or mechanical factors, or biological factors.^[6,7]

Several studies have shown association between patient-dependent factors, including tobacco smoking, diabetes mellitus, NSAIDs and glucocorticoids, and complications resulting in delayed healing and increased rates of non-union.^[8-11]

The aim of this study is to identify the associating patient-dependent known risk factors and causes of failure of fracture healing.

Methods

Research approach

Institutional based cross-sectional study conducted in Saudi Arabia, Riyadh, National Hospital, and care Hospital. Study includes 90 Fracture healing failure male patient above age of 18 and exclude females and patients under 18 the participants were choosing through consecutive sampling all patient from February to march.

Data collection through Pretested Pre-Coded self-administered questionnaire and it was subjected to a probe to test for validity and reliability. Data analysis Using SPSS version 20, charts and tables generated by using Microsoft Excel. *P* value of less than 0.05 considered as significant results. Chi-square test was the test of significance.

Ethical consideration: Consent obtained from participant before data collection, emphasizing of confidentiality and the right of participant to withdraw from the study at any point of time.

Results

Table 1 showed the age range of the patients (4.4%) of patients are 18-24, and (24.4%) are 25-34, and (36.7%) are 35-44, and (20.0%) are 45-54, and (14.4%) are 55 ≤ .

Table 1: Personal information

Age	18-24	25-34	35-44	45-54	≤55
	4 (4.4%)	22 (24.4%)	33 (36.7%)	18 (20.0%)	13 (14.4%)
Nationality	Saudi 16 (17.8%)		Non-Saudi 74 (82.2%)		
Occupation	Unskilled Labor Jobs 32 (35.6%)	Skilled Labor Jobs 32 (35.6%)	Office Jobs 26 (28.9%)		

n = 90

Also, Table 1 showed that the majority of patient are non-Saudi with percentage of (82.2%) while Saudi patients are (17.8%).

And this table showed that patient's occupation, unskilled labor jobs account for (35.2%) and skill labor jobs for (35.2%) and office jobs for (28.9%).

Table 2 discusses the Risk Factors of Fracture failure.

Our result indicated that 13.3% have Osteoporosis, 27.8% have Diabetes mellitus, 1.1% have Malignancy, 13.3% have Post-surgery infection, 4.4% have Anemia, 1.1% have Hyperparathyroidism, 62.2% were smokers, 10% were taking steroids, and 95.6% did follow the doctor's instruction after the surgery.

Table 3 showed that 50% of fracture failure was diagnosed as delayed union while non-union accounts for 40% and malunion for 10%.

Table 4 showed the relation between the type of fracture failure and diabetes mellitus we found in 25 cases. 52% related with non-union, 44% with delayed-union, and 4% with malunion.

Table 5 showed the relation between type of fracture failure and Cigarettes Smoking we found in 58 cases. 8.62% related with Malunion, 32.75% with Non-union, and 58.62% with Delayed union.

Discussion

Our results indicated that the most common patient-dependent risk factor associated with fracture healing failure were smoking, and diabetes mellitus, this finding is consistent with a study in Japan, 2013,^[6] and Michael *P* Gaspar 2015.^[12] both of them regarding the most common patient-dependent risk factor, and we believe that the smoking and diabetes mellitus are the most common Patient-dependent factor affecting bone healing.

Our findings indicate that the majority of diabetic patient with fracture healing complication had non-union, Shibuya N.^[13] Our findings go with line regarding the complication of diabetic patient, number one is nonunion followed by delayed union.

We also found that the commonest complication of fracture healing in smoker's patients were delayed union, Pearson RG^[14] Patel RA^[15] other researchers also found increased of time needed to heal for smokers compared to non-smoker patients while Messner MK^[16] found smoker were more associated with non-union.

Conclusion

We found that the most associating known risk factors were cigarettes smoking and Diabetes mellitus, also we found that most fractures failure were diagnosed as delayed union, non-union, and malunion respectively.

Table 2: Risk Factors

	Yes	No	Total
Do you have any of these disorders?			
Osteoporosis	12 (13.3%)	78 (86.7%)	90 (100%)
Diabetes mellitus	25 (27.8%)	65 (72.2%)	90 (100%)
Malignancy	1 (1.1%)	89 (98.9%)	90 (100%)
Post-surgery infection	12 (13.3%)	78 (86.7%)	90 (100%)
Anemia	4 (4.4%)	86 (95.6%)	90 (100%)
Hyperparathyroidism	1 (1.1%)	89 (98.9%)	90 (100%)
Are you smoker?	56 (62.2%)	34 (37.8%)	90 (100%)
Are you taking any Steroids recently?	9 (10%)	81 (90%)	90 (100%)
Did you follow the doctor's instruction after the surgery?	86 (95.6%)	4 (4.4%)	90 (100%)

n = 90

Table 3: Type of fracture failure

	Malunion	Non-union	Delayed union	Total
The proportion of Fracture failure	9 (10%)	36 (40%)	45 (50%)	90 (100%)

n = 90

Table 4: Relation between type of fracture failure and Diabetes mellitus

	Malunion	Non-union	Delayed union	Total
Diabetes mellitus	1 (4%)	13 (52%)	11 (44%)	25 (100%)

n = 90

Table 5: Relation between type of fracture failure and Cigarettes Smoking

	Malunion	Non-union	Delayed union	Total
Smoking	5 (8.62%)	19 (32.75%)	34 (58.62%)	58 (100%)

Recommendation

- MOH should establish a new program to decrease the percentage of smokers and diabetic patients in the new generation.
- Researchers should investigate the cigarette smoking dose that lead to failure of fracture healing.

Acknowledgements

The authors are thankful to the management of AlMaarefa University, for providing facilities to carry out the work.

Ethical approval

Research was approved by the IRB of AlMaarefa university (4/192).

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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