Injury, Int. J. Care Injured 47 (2016) 930–933

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Colles' fractures and osteoporosis—A new role for the Emergency Department

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ARTICLE INFO

Article history:
Accepted 19 November 2015

Keywords:
Osteoporosis
Distal forearm fractures
Referral
Colles fracture

ABSTRACT

Purpose: In Denmark, guidelines from the Danish Orthopedic Society recommend that patients older than 65 years who sustain a Colles' fracture should be referred to assessment of underlying osteoporosis. An assessment of referral rates at our hospital during the period October 2010–September 2013 showed that none were referred. Due to this, an automatic out-patient referral system for assessment of underlying osteoporosis was established. With this system, patients are referred directly from the Emergency Department (ED). The purpose of this study was to assess how effective this new referral system was at improving referral rates for assessment of osteoporosis and to evaluate how many more cases of osteoporosis that was identified with this practice during the period October 2013–September 2014.

Method: The automatic referral system for evaluation of osteoporosis in patients 65 years and above without known osteoporosis, living in the catchment area and sustaining a low energy distal forearm fracture was established in October 2013. With the new system, patients were referred directly from the ED for evaluation of osteoporosis at the osteoporosis out-patient department at the hospital. The system was evaluated for the period October 2013–September 2014. For comparison data was collected on the same patient group for the 3 years preceding the system.

Results: Before the automatic system none were referred for evaluation of osteoporosis and thus none were diagnosed. After introduction of the system 100% were referred, 73.26% were examined and 65.08% of these were found to have osteoporosis. Anti-osteoporotic treatment was initiated in all but 4.88% of the patients.

Conclusion: The results show that this type of automatic referral system can be an effective way of increasing the number of patients diagnosed with and treated for osteoporosis. It also shows that involvement of the ED in the screening for osteoporosis can be an effective way of increasing referral rates leading to higher rates of diagnosed osteoporosis. The early identification and initiating of treatment might result in a lower rate of secondary and potentially more severe osteoporotic fractures.

Introduction

Low energy hip, spine and wrist fractures are considered osteoporotic fractures with the latter regarded as one of the earliest manifestations of osteoporosis [1]. Osteoporosis has been found in 50.3% of women and 23.7% of men sustaining a Colles' fracture [2,3]. As such, people not diagnosed with osteoporosis and suffering one of these fractures should be referred for assessment of osteoporosis. Although doctors seem to agree on this, the literature suggests that current practice may be inadequate [4]. In Denmark, guidelines from the Danish Orthopedic Society recommend that patients older than 65 years of age who sustain a Colles' fracture should be referred to assessment of underlying osteoporosis [5]. Referral of the patients is conducted by doctors at the emergency departments (ED) and orthopedic out-patient departments together with the general practitioners (GP). An assessment of referral rates at our hospital during the period October 2010–September 2013 showed that none were referred for assessment of osteoporosis. Due to this an automatic out-patient referral system

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http://dx.doi.org/10.1016/j.injury.2015.11.029
0020–1383/

for assessment of underlying osteoporosis was established from October 2013. The purpose of this study was to assess how effective this new system was at improving referral rates for assessment of osteoporosis and to evaluate how many more cases of osteoporosis that was diagnosed during the period October 2013–September 2014.

Material and methods

Study design and data collection

The study was conducted at the Department of Emergency Medicine, Holbæk Hospital, Denmark. Before October 2013 patients at our hospital were referred for evaluation of osteoporosis manually by the individual doctor. From October 2013 patients were automatically referred if fulfilling the following criteria: Treated for a Colles'- or distal radius fracture at our ED, age above 65 years, low energy trauma, no earlier diagnosis of osteoporosis and living in the hospitals catchment area at the time of injury. Patients sustaining a high-energy fracture were excluded. Information on fracture type was gathered from the electronic charts with the ICD-10 diagnose codes DS525—distal radius fracture and DS525B—Colles' fracture. Both codes were used even though only Colles' fractures are mentioned in the guidelines, since they share a common trauma mechanism. Age was assessed through the social security number and known osteoporosis through the ICD-10 codes. The automatic system works though a monthly collection of data on all patients meeting the above mentioned criteria. The data is sent to the osteoporosis out-patient department at the hospital who by letter invites the patients for osteoporosis evaluation by DXA-scan. The patients are informed both in writing and orally in the ED that they will receive the invitation. Follow-up and treatment is conducted by the out-patient department.

In this study the automatic system was evaluated for a 1 year period (October 2013–September 2014) and in order to determine how effective the system was at increasing referral rates for assessment of osteoporosis, comparisons were done with data collected on patients fulfilling the criteria of the automatic system for the 3 years (October 2010–September 2013) preceding the introduction of the system. A period of 3 years was chosen to make sure that the results of this period were representative of the current practice, thus minimizing the bias of one bad year.

For this study, data was collected for both periods through review of hospital records and included: gender, age, date of injury, known osteoporosis, trauma mechanism, fracture type and classification, referred for assessment of osteoporosis and medical treatment if diagnosed with osteoporosis. Data on reason of declining assessment of osteoporosis was not registered and as such not presented in this study. During the year with the automatic system, all patients were referred for assessment of osteoporosis. For the period before introduction of the system, conduction of a DXA-scan performed no more than 3 months after the injury were used as surrogate marker of referral for assessment of osteoporosis. The DXA scanner used for evaluation was the GE Lunar iDXA System nr.: ME + 200179. Both the lumbar spine and hips were scanned. For the lumbar spine and hips the reference population v112 were used. For both the periods a T-score ≥ -2.5 resulted in the diagnosis of osteoporosis. Patients with osteopenia were for the study categorised as non-osteoporotic. For the period before the automatic system, it was not possible to assess, with sufficient certainty, whether patients were offered assessment for osteoporosis and had declined and due to this, the parameter was not included. In order to access whether patients coded as Colles' and distal radius fracture had a fracture and in case of Colles' fracture which older type it was, X-ray pictures taken in relation to the injury were assessed by an experienced clinician. In case of uncertainty an orthopedic surgeon was consulted for clarification. Patients coded as Colles'- or distal radius fracture that had no radiographic evidence of this was excluded from the study.

Subjects

Three hundred and forty nine patients were coded with a fracture during the period October 2010–September 2013. Eight were excluded due to lack of fracture and seven due to known osteoporosis. As such 334 patients were included for this period. From October 2013 to September 2014,114 patients were coded with a fracture. Seven had no fracture, 16 had known osteoporosis, 5 died prior to examination and thus 86 were included. No patients had a high energy fracture. See Table 1 for basic characteristics.

Statistical analysis

Analyses of categorical data were conducted using Chi-square tests. Differences in mean values for normally distributed variables between the groups were calculated using Student *t*-tests. All analyses were two-sided and a p-value < 0.05 was considered as statistically significant. Statistical analysis was performed with SAS statistical software version 9.4 (SAS Institute Inc., Cary, NC, USA). All statistical analyses were conducted using the same software package.

Results

Before introduction of the automatic referral system no patients were referred for evaluation of osteoporosis and thus none were diagnosed or treated. After introduction, 100% were refereed. Of these 26.74% declined due to various reasons and as such, 73.26% were examined. 65.08% of the examined patients were diagnosed with osteoporosis (Fig. 1) 36.36% of the men and 71.15% of the women examined were found to have osteoporosis. Of the patients diagnosed with osteoporosis anti-osteoporotic treatment were

Table 1
Basic characteristics of included patients.

	2010/2013	2013/2014
Patients (men:women)	334 (41:293)	86 (15:71)
Mean age (range)	76.60 (65.07–98.70)	75.77 (65.32–98.77)
Number of distal radius fracture (%)	50 (14.97)	11 (12.79)
Number of Colles' fracture (%)	284 (85.03)	75 (87.21)
Older type (%)		
I	74 (26.06)	16 (21.62)
II	92 (32.39)	30 (40.54)
III	79 (27.82)	21 (28.38)
IV	39 (13.73)	7 (9.46)
Trauma mechanism (%)		
Low-energy trauma, external force (e.g. slippery roads)	48 (14.37)	17 (19.77)
Low-energy trauma, no external force (e.g. balance problems)	14 (4.19)	1 (1.16)
High-energy trauma (car crash, dead person in crash, riding accident)	0 (0)	0 (0)
Unknown trauma mechanism	272 (81.44)	68 (79.07)

*$P < 0.05$; 2013/2014 = period with automated referral system.