Importance of measuring Bone Mineral Density in Adult Coeliac Disease Patients

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ABSTRACT: This study was conducted with an aim to confirm the presence of osteoporosis in patients proven to be suffering from Coeliac Disease and compare present practice in the hospital against the guidelines suggested in the published literature. Information was obtained by retrospective analysis by reviewing notes of 73 patients with coeliac disease, who are registered in the database of a busy Gastroenterology Department of Sunderland Royal Hospital. Of the total of 73 patients, 54 patients underwent a DEXA scan at diagnosis and the Osteoporosis (WHO defined criteria of T score below 2.5 SD the mean adult) was detected in 15(27.3%) of them. 6 of the 15 patients detected to have osteoporosis were less than 53 years of age. Osteoporosis is common in patients with coeliac disease, and need regular monitoring for osteoporosis, as they are at significant risk of developing it.

KEY WORDS: Osteoporosis, Coeliac Disease, Bone Mineral Density.

INTRODUCTION:

Osteoporotic fractures are a major public health problem.[1] It has been estimated in the USA the lifetime fracture risk at the age of 50 years is 40% for white females and 13% for white males,[1] the major fracture sites being spine, forearm and hip. This results in considerable morbidity and mortality and rising cost including acute hospital care and long term care in home or nursing home. The estimated annual cost of Osteoporotic fractures in England and Wales is £1.73 billion.[2] Osteoporosis is a frequent complication in the course of various gastrointestinal disorders like coeliac disease, Inflammatory Bowel Disease (Especially those on steroids) and Liver Diseases. Coeliac disease is a lifelong intolerance to the gluten found in wheat, barley and rye, and some patients are also sensitive to oats.[2] The disease is genetically determined, with 10% of the first-degree relatives affected. 95% of the patients with coeliac disease are human leucocyte antigen (HLA)-DQ2 or HLA-DQ8 positive.[3] Characteristically, the jejunal mucosa becomes damaged by a T-cell-mediated autoimmune response that is thought to be initiated by a 33-mer peptide fragment in A2 gliadin, and patients with this disorder have raised levels of anti-endomysial antibodies in their blood.[3] The mechanism of underlying osteoporosis in coeliac disease is secondary to calcium malabsorption leading to increased parathyroid hormone secretion, which in turn, increases the bone turnover and cortical bone loss.[4] Vitamin D malabsorption is probably of less significance. Though it has been recognised that osteomalacia may coexist in these patients, especially before treatment and may need treatment with vitamin D. In some men, there may be loss of gonadal function, as in women, may cause osteoporosis.[4]

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MATHODOLOGY:

This is retrospective analysis of patients with coeliac disease who were attending Gastroenterology clinics of the Sunderland Royal Hospital. The diagnosis of coeliac disease was based on the clinical presentation, serological evidence of presence of Anti-Endomysial antibodies and characteristic histology and response to gluten withdrawal. There have been studies done to reconfirm the presence of Osteoporosis in patients with coeliac disease.[5-13] Most studies have emphasised the importance of performing DEXA scan at diagnosis, irrespective of the patient's age, sex, and race. The published literature have also suggested ways of following up these patients with DEXA scans at regular interval, depending on the status demonstrated on the first DEXA scan.

Dual energy X-ray Absorbsiometry (DEXA) Measurement: DEXA scan were performed in the medical physics department of Sunderland Royal Hospital. Bone Mineral Density (BMD) was measured at the hip and the lumbar spine, and was expressed as number of standard deviations above and below either the mean BMD of the young adult (T score) or the mean BMD for the age matched controls (Z score).

A BMD of 2.5SD or more below the mean are taken to be indicative of osteoporosis.[14] Stratification of fracture risk is possible using BMD. The risk increases roughly two fold for each SD decline below the population mean.[14,15] Hence, the endeavour about the need to evaluate the present patient management strategy based on following guidelines **(Table 1)**:

Table 1: Summary strategy for prevention and treatment of osteoporosis in coeliac disease[1]

General advice

- Strict gluten-free diet **
- Adequate dietary calcium; add calcium tablets if necessary to
- Ensure daily intake of 1500 mg ***
- Exercise ***
- No smoking **
- No alcohol excess **
- Seek and treat vitamin D deficiency
- Measure BMD at diagnosis; if low reinforce above advice

Postmenopausal women

- Measure BMD at menopause or when first seen
- If osteoporotic[†] offer:
- HRT, preferably by skin patch, or ***
- Bisphosphonate orally, or ***
- Calcitonin ***

Men >55 Years

- Measure BMD
- If osteoporotic[†] offer bisphosphonate or calcitonin **

All with Fragility Fracture

- Measure BMD
- If osteoporotic[†] offer HRT (if post menopausal), bisphosphonate or calcitonin **
- If already on HRT consider adding bisphosphonate or calcitonin *

Duration of Drug Treatment

- For bisphosphonate and calcitonin measure BMD yearly
- If BMD falls >4% per year in two successive years change to other drug
- If no fall continue drug for at least three years — possibly long term ***
- Restart drug if, on stopping, yearly BMD falls >4%
- For HRT check BMD after 10 years and continue HRT if osteoporosis persists *

[†]Osteoporosis defined as BMD >2.5 SD below mean for young adult.
******, ** and * indicate the level of evidence for the recommendation (see text).***

RESULTS:

Total of 73 patients were enrolled for retrospective analysis. Of them 44 were females and 29 were males. Average age of the female patients was 49 years and of male patients were 42. Age wise distribution of the patients enrolled in the study is shown in **Table 2**.

Total of 54 patients underwent DEXA scan at the diagnosis and 15 (27.3%) were found to be Osteoporotic at presentation. Amongst the patients detected to have osteoporosis, 9 (60%) were females and 6(40%) were males. Age distribution of the patients detected to have osteoporosis is shown in the **Table 3**.

Subsequent course of the treatment of these patients was also analysed in this retrospective analysis irrespective of whether they were osteoporotic or not. The remaining 39 patients who were found to be free from osteoporosis, during the initial DEXA scan were also followed up. The entire duration of the follow up consisted of DEXA scans every 2years. Of these patients 13(33%) were detected to have osteoporosis on the subsequent scan. On the subsequent DEXA scan, only 1 patient was found to have worsening of osteoporosis, though without a fracture and the treatment was modified in keeping with the suggested guidelines and needs future DEXA scans. Amongst the rest of 12 patients, 8(75%) had improvement in the BMD on the DEXA scan, which was helped by the strict adherence to the gluten free diet.

Table 2: Age distribution of subjects enrolled in the study

Age group	Male		Female	
	No.	%	No.	%
Less than 36 years	09	35	05	11
36-52 years	10	33	20	40
53-72 years	09	32	17	38
More than 72 years	01	03	05	11
Total	29	100	44	100

Table 3: Age distribution of the patients having osteoporosis

Age group	Male	Female	Total
Less than 35 years	01	00	01
36-53 years	01	05	06
54-72 years	04	04	08
More than 72 years	00	00	00
Total	06	09	15

DISCUSSION:

It is important to recognise that osteoporosis is but one of a number of factors predisposing to fracture, just as a raised cholesterol and diastolic pressure are each just one of many factors predisposing to coronary artery disease.[4] Awareness of surroundings, mobility, and eyesight collectively contribute to a tendency to fall and all are likely to be important.[16] Furthermore, bone strength is largely related to trabecular structure, certainly in the proximal femur, whereas BMD is a composite measurement of both cortical and trabecular bone.[17] Although the population can be stratified for fracture risk using BMD measurements, its poor sensitivity for predicting actual fracture makes it unsuitable for screening the whole population or even all post-menopausal women—the difficulties and costs are great and it would have only a small contribution to fracture prevention in the community as a whole.[4,18–20] The alternative is to target certain high risk groups for screening or treatment, or both. The evidence for reduced BMD in coeliac disease is good.[5–13] One study[19] showed that 47% of women and 50% of men on a gluten-free diet had osteoporosis defined as BMD more than 2 SD below mean peak bone mass measured by DEXA. The BMD was positively related to calcium intake, body mass index (BMI) and menopausal age. Other studies have shown significant improvement one year after starting a gluten-free diet, [21] normal BMD in patients who had been on a gluten-free diet since childhood,[15] and improved bone mineralization on a gluten-free diet in childhood and adolescence.[22] The

incidence of fractures in coeliac disease is not known but there is no reason to suppose that the reduction in BMD is less predictive of fracture risk than in the general population.[4] The abstract of one study[23] reported a significantly higher proportion of patients with a history of fracture than controls (21% v 3%). The mean age was 52 years and there was no relation between fracture and BMD.

The reasonable explanation of the fact that only 54 out of total 73 patients did not undergo the DEXA scan at diagnosis, is that these patients have been enrolled from the early 80's, and then there were no evidence for the screening every patient with coeliac disease for osteoporosis, and hence in the light of recent research and evidence we were compelled to change the present practise which I presume will help maintain healthy bones in the coeliac disease community and will reduce the associated morbidity and the cost to the healthcare system.

CONCLUSION:

This retrospective analysis reemphasises the fact that there is increased risk of osteoporosis in the patients who suffer from coeliac disease, and it predisposes these patients with fairly early onset of osteoporosis .Therefore screening and following them up, in the light of recent evidence for the presence and progression of it, is advisable and beneficial to the patients in the long term.

LIST OF ABBREVIATIONS:

DEXA- Dual energy X-ray Absorptiometry, BMD- Bone Mineral Density and HRT- Hormone Replacement Therapy.

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