CONCISE REPORT

Oral corticosteroid prescribing in women over 50, use of fracture prevention therapy, and bone densitometry service

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Objective: To identify the most common diseases and age of corticosteroid use in women over 50, dosage in last year, duration of oral corticosteroid use, prescription for fracture prevention (drug used), and referrals for bone densitometry.

Methods: General practice records from 41 practices in Shropshire identified 62 230 women aged >50 from a population of 80 082. Data on fractures, duration of corticosteroid use, dose in the study year (1 April 1997–31 March 1998), use of fracture prevention therapy and bone densitometry were sampled from one out of three records.

Results: 3.2% were prescribed corticosteroids; 633 patients investigated in detail aged 70.1 (SD 10.5) years, had been prescribed 1526 (SD 1727) mg prednisolone (median 1040 mg) for 3.31 (SD 3.20) years (median 2.0 years). Patients with asthma/lung disease, most common in the younger group, had the lowest annual corticosteroid use; patients with rheumatoid arthritis (RA), polymyalgia rheumatica/temporal arteritis (PMR/TA), who were more likely to be elderly, had the highest annual use. Between the age of 70 and 79 years patients with RA had significantly more hip fractures than the other groups, and corticosteroid prescribing was most common. Bisphosphonates or hormone replacement therapy were prescribed for 48% aged 50–59 years but only 32% at 70–79 years ($p<0.01$); patients with asthma and RA being less likely recipients ($p<0.01$). Referrals for bone densitometry had occurred in 20.2%, with 60.2% having osteoporosis. Referrals were more common in those taking corticosteroids for longer periods ($p<0.01$).

Conclusions: The elderly had the most prescriptions for corticosteroid treatment but the fewest for effective fracture prevention therapy. Patients with RA, PMR/TA had the greatest corticosteroid dosage, for the longest time. Patients with RA sustained more hip fractures than other groups but were least likely to have effective fracture prevention therapy prescribed.

Oral corticosteroids remain valuable treatment for several conditions. Non-vertebral¹ or vertebral fracture^{1–4} are complications which may be reduced by bisphosphonates.^{3,4} Fracture prevention therapy (FPT), including hormone replacement therapy (HRT), has limited application.^{5,6} In a United Kingdom general practice database study, FPT use including calcium and vitamin D for corticosteroid induced osteoporosis was approximately 5%.⁷ Most patients taking corticosteroids are postmenopausal women,⁵ particularly those aged 70–79,⁷ who are at greatest risk of fracture. Longer treatment and higher dose encourage

bisphosphonate or calcium and vitamin D use,⁷ but the proportion treated was low at all ages.

We have investigated oral corticosteroid use with age and duration of treatment in general practice in Shropshire. Postmenopausal women were selected as most likely to need FPT, but effective FPT is expensive. We investigated the age group having fractures and requiring targeting for FPT. We ascertained the proportion of women taking FPT, treatments used, and fracture prevalence and also investigated the number who had undergone bone densitometry (open access since 1988 in Shropshire) and the action taken.

METHODS

Data identified from practice records without patient contact were coded and not identifiable. Forty one practices out of 67 (61%) in Shropshire, UK, covering 73.6% of the regional population, had practice records sufficiently detailed to audit. Data of all patients aged ≥ 50 who had received a prescription for oral corticosteroids (inhaled, intranasal steroids, and hydrocortisone for replacement therapy were excluded) between 1 April 1997 and 31 March 1998 were recorded. One third of these (about 30 patients per practice) were randomly selected for detailed appraisal. The following data were collected: age, sex, diagnosis, reason for corticosteroid treatment, year of first prescription, duration of corticosteroid use (date of most recent prescription in the study period—date on which first prescription for corticosteroid was written), name of corticosteroid, dose and treatment regimen, total prescriptions written for corticosteroid between 1 April 1997 and 31 March 1998, corticosteroid dosage taken in the 12 month study period, named treatment for osteoporosis (whether given before or after a fracture was not necessarily known), site and number of low trauma non-vertebral fractures occurring after age 50, and referral for bone densitometry.

Vertebral fractures ($n=14$) were not included. These may be unrecognised and awareness in patients using higher dose corticosteroids encourages radiography, causing bias towards an increased prevalence of vertebral fracture. Because dosage in earlier years was uncertain, lifelong corticosteroid intake was not calculated.

The χ^2 test or Fisher's exact test was used to investigate differences between groups and adapted for detection of a trend (SPSS package, version 9 (Chicago, Ill, USA)). Data (mean (SD)) were analysed using analysis of variance or the Kruskal-Wallis test if not normally distributed.

Abbreviations: FPT, fracture prevention therapy; HRT, hormone replacement therapy; PMR, polymyalgia rheumatica; RA, rheumatoid arthritis; TA, temporal arteritis

Table 1 Fracture prevalence since age 50 in patients receiving corticosteroids

Age (years)	n	Duration of corticosteroid (years)			Site of fracture (since age 50)							Total
		Mean	SD	Med	Wrist	Other upper limb	Hand	Hip	Other lower limb	Foot	Other	
50–9	120	3.0	3.6	2	2	3	0	0	0	1	1	7
60–9	174	3.2	3.6	2	10	3	1	2	6	4	0	26
70–9	215	3.4	2.9	3	9	9	1	5	14	1	3	42
>79	124	3.7	2.8	3	11	2	2	10	13	3	4	45
Total	633	3.3	3.2	2	32	17	4	17	33	9	8	120

RESULTS

The female population aged 50 or more from the 41 practices numbered 62 230 (77.7% of women aged 50 or more in Shropshire). Oral corticosteroids had been taken by 1984 (3.2%) in the previous year. Detailed information, obtained for one in three patients (see "Methods"), yielded 633 records with reliable data. These patients were aged 70.1 (10.5) years (mean (SD)): 120 (19%) being 50–59 years; 174 (27%), 60–69 years; 215 (34%) 70–79 years, and 124 (20%) aged over 79 years. In the review year, prednisolone was the only corticosteroid used, the dosage being 1526 (1727) mg (median 1040 mg). Three hundred and twelve (49.3%) of the patients received <1000 mg, 162 (25.6%) received 1000–2000 mg, and 159 (25.1%) received >2000 mg. Duration of corticosteroid taking was 3.31 (3.20) years (median 2.00 years), with 71 (11.2%) having taken corticosteroids for <1 year, 428 (67.6%) for 1–5 years, and 134 (21.2%) for >5 years. Duration of corticosteroid use was 3.47 (2.75) years (median 3 years) in the patients with polymyalgia rheumatica/temporal arteritis (PMR/TA); 3.93 (3.44) years (median 3 years) in rheumatoid arthritis (RA); 3.31 (3.60) years (median 2 years) in asthma and chronic obstructive airway disease (designated as asthma); and 2.40 (2.54) years (median 1 year) in other diseases (between-group difference $p < 0.001$). Ingestion of corticosteroid in the review year was 1716.9 (1219.0) mg in patients with PMR/TA, 1662.5 (1011.9) mg for RA, 1256.2 (2091.3) mg for asthma, and 1608.3 (2145.6) mg for other diseases ($p < 0.05$ between groups). Asthma dominated the group taking <1000 mg. In the higher dosage groups, PMR/TA and RA were most commonly associated with corticosteroid ingestion. Asthma prevailed in the 50–59 year age group, whereas PMR/TA predominated over the age of 70.

Fracture prevalence increased with age (table 1, fig 1). Although there was no difference in total fracture prevalence according to diagnosis, individual fractures showed a difference. Patients aged 70–79 years with RA had more hip fractures (8.1%) than patients with all the other diseases (1.1%), controlled for duration of corticosteroid use and dosage ($p < 0.05$). Fractures occurred more than once (any site) in 12 out of 106 subjects (asthma (0.89%), PMR (2.5%), RA (3.3%), other diseases (2.1%) ($p = \text{NS}$)). Only two patients with hip fracture (11.8%) had a previous fracture. Recurrent fracture was not significantly affected by FPT.

Fracture prevention therapy

About 47% received either HRT, bisphosphonates, or calcium supplements. FPT use decreased significantly with age (χ^2 for trend $p < 0.01$; fig 2). The trend was most marked for HRT, with greatest use in the sixth decade (fig 2). Combined use of HRT and bisphosphonates fell from 48% in the youngest group to 32% in the 70–79 year group (χ^2 for trend $p < 0.01$). Bisphosphonate use rose from 7.5% in the 50–59 years group to 22.5% in those over 79 years; calcium use alone was stable at 12.2% in those over 59 years. FPT rose from 31% in patients receiving corticosteroids for <1 year to 59% in those treated

Figure 1 Fracture prevalence (No with fracture/No in group) in patients receiving oral corticosteroid treatment by age and disease. RA, rheumatoid arthritis; PMR, polymyalgia rheumatica and temporal arteritis; COPD, chronic obstructive pulmonary disease.

Figure 2 Proportion of patients receiving fracture prevention therapy for corticosteroid induced osteoporosis according to age and type of treatment.

for >5 years (χ^2 for trend $p < 0.01$). Patients with RA and asthma were less likely to receive FPT than other patients (χ^2 $p < 0.01$). Patients taking higher corticosteroid doses received more FPT than those receiving lower doses (37% receiving <1000 mg in the previous year, 57% receiving 1000–2000 mg, and 59% receiving >2000 mg; χ^2 for trend across the three corticosteroid dosage bands $p < 0.01$). In the highest dose group, calcium was the FPT used in 26.6% of those receiving treatment.

One hundred and twenty eight (20.2%) patients had bone densitometry, 77 (60.2%) having osteoporosis. Scanning was equally frequent at 50–59 years (23.3% scanned; 43% of those scanned being positive for osteoporosis), 60–69 years (24.1%; 81% positive), and 70–79 years (22.8%; 55% positive), but

declined in those over 79 years (7.3%; 44% positive). Scanning was more frequent in patients receiving long term corticosteroids, with 8.5% of those taking corticosteroids for <1 year, 19.6% of those for 1–5 years, and 26.7% of those for >5 years (χ^2 for trend $p < 0.01$). Scans were requested more frequently in patients taking higher doses but this was not significant.

DISCUSSION

Corticosteroid use in our population, almost twice that in 1996 in women >55 years,⁵ was consistent with increased prescribing of corticosteroids.⁸ Forty seven per cent received FPT compared with 18.8% in 1996⁵ and lower rates in other studies.⁷ Greater duration and dosage were associated with increased FPT. Prevention of corticosteroid associated fractures using bisphosphonates (compared with calcium and vitamin D) has been recorded for vertebral fractures,^{3 4 9 10} whereas use of HRT prevents bone loss in the spine.¹¹ Reduction of bone loss in the upper femur has been shown in patients taking corticosteroids treated with risedronate (compared with calcium and vitamin D).^{4 10} Younger patients were the most likely to receive effective treatment. In those aged over 70, 13% received calcium alone.

Women having more than one non-vertebral fracture (2.01%) were few compared with the 12% (including vertebral fracture) with lung disease.⁶ The latter had received more corticosteroid for longer, suggesting that they were more seriously affected patients than those in our overall survey.

The frequency of single fracture after 50 years (106/633 (16.7%) patients) was similar to that of recurrent fracture in patients sustaining a fracture (12/106 (11%)), and in patients with hip fracture (2/17 (12%)). Distinguishing the effect of disease and corticosteroid is difficult as patients taking corticosteroids have severe disease. The variable patterns and amount of corticosteroid usage led us to include all fractures sustained after 50 years. Prevention of first fracture is important if fracture frequency is to be reduced in these patients. Earlier studies in a group with hip fracture have not recorded an increased fracture risk in patients with RA taking corticosteroids.¹² Our study failed to identify corticosteroid duration of treatment or dose as risk factors. The greater prevalence of hip fracture shown in older women with RA suggests that attention should be paid to fracture prevention in these patients, although interrelationships between disease activity and corticosteroid treatment were not addressed.

Application of bone mineral densitometry in detecting osteoporosis was investigated. Fractures may occur at higher bone density than T-2.5 in corticosteroid induced osteoporosis,¹³ but recent studies suggest that the guidelines are valid¹⁴ for detecting patients at risk of spine and hip fractures. The proportion of the population scanned (20%) was low up to 70 years, after which it halved. Duration of corticosteroid treatment rather than dosage determined requests. Osteoporosis in 60% of patients scanned suggests that densitometry might be applied more widely.

Our findings indicate that the elderly are those most likely to receive corticosteroids and have the most fractures, and investigation and treatment of their corticosteroid induced osteoporosis is being neglected. Bone densitometry not only identifies osteoporosis in a significant number of these patients, but will also identify patients with low bone density, who need continued treatment to prevent fracture when their corticosteroid treatment ends.¹⁵

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