

Salmon calcitonin in the treatment of elderly women with type 2 diabetes complicated with osteoporosis

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Abstract: To explore the reasonable treatment scheme of salmon calcitonin in the treatment of elderly women with type 2 diabetes complicated with osteoporosis, patients were randomly divided into Group A, B and C, and they were given the salmon calcitonin every time 50 IU, subcutaneous injection. The Group A were 1 time a day, for 15 days; Group B were 1 time every 2 days, for 30 days; Group C, one time three days for 90 days. Then to observe the symptoms have efficiency, bone density T value change, incidence rate, incidence of side effects and treatment of loss rate of fracture. Efficiency of symptoms: Group A is lower and there is no difference in Group B and C. T Degree: Group C was significantly increased and Group A was the lowest. Fracture incidence of Group B and C were significantly lower than Group A, and there is no difference in Group B and C. Turnover rate: Group A was significantly lower than B and C, and there is no difference in Group B and C. There is low incidence of side effects in the three groups and they three have no significant difference. Conclusion: It is effective and safe to use salmon calcitonin in the treatment of elderly women with type 2 diabetes complicated with osteoporosis. 50IU each time, subcutaneous injection, 1 time every 3 days, for 3 months is a reasonable solution.

Keywords: Salmon calcitonin / application osteoporosis / therapy elderly women type 2 diabetes.

INTRODUCTION

Salmon calcitonin has been used in the treatment of osteoporosis for nearly 30 years and it has been approved to the treatment of menopause osteoporosis by American FDA in 1984 (Cruber HE, *et al*, 1984). A study in Europe has showed that a short-time salmon calcitonin injection is effective while it doesn't have a clear benefit for a long time application (www.ema.europa.eu, 2012, 2013). Pooneh Salari Sharif's idea (Pooneh Salari Sharif, 2011) and A. Shirwaikar application Raloxifene's method to treat the osteoporosis (A. Shirwaikar, *et al* 2011), they all have a beneficial influence in reducing the bone wastage. The Salmon calcitonin has been used in China for over 20 years, the experts all advised a short-time application and it could be applied repeatedly and intermittently (Zhu H *et al.*, 2103). In recent years,

Chinese experts have a certain study on the bone mineral density decrease of elderly women with diabetes mellitus combined osteoporosis disease (Zhao W *et al.*, 2008) and salmon calcitonin has a effective benefit on treating the elderly women's osteoporosis (Song L *et al.*, 2011). Nevertheless, there still not exists a big sample study and report of the curative effect, course of treatment and side effect on salmon calcitonin treating the elderly women with diabetes mellitus combined osteoporosis. In this study, through the analysis of levels in pain relief, changes in bone mineral density, fracture risk rate, side-effect rate, treatment compliance and so on, it studies the

treatment effect of different salmon calcitonin application on elderly women with type 2 diabetes mellitus combined osteoporosis disease to investigate a reasonable treatment in the mentioned patients. The results are reported as below.

MATERIALS AND METHODS

Materials

All the observed objects, a total of 323 cases, were elderly women with diabetes combined osteoporosis disease who were hospitalized in our hospital endocrine section from October, 2012 to February, 2014, aged 65-79, on average 71.2±8.1 years old. 98 patients in Group A, average age is 70.8±7.9, the duration is 11.17±6.2 years, pre-treatment bone mineral density (BMD) T-score -3.8±2.1; Group B 115 patients, average age 71.3±7.6 years, the duration is 10.8±5.9 years, pre-treatment (BMD) T-score -3.7±2.2; Group C 110 patients, average age 71.4±8.2 years, the duration is 11.2±6.3 years, pre-treatment (BMD) T-score -3.6±1.9. The differences in patients' pre-treatment age, duration and bone mineral density are not significant.

Research methods

Standards

Inclusion criteria: elderly women: 65-79 years old; accord with WHO 1999 type 2 diabetes diagnosis and WHO 1994 senile osteoporosis diagnosis.

Exclusion criteria

Patients with the exception of other serious organic disease, patients with osteoporosis caused by other

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reasons. Absorptiometry Methods in bone mineral density: We select and use the Metri Scan TM absorptiometry produced by American Alara to hand X-ray quantitative calculation phalanx bone density, total T values.

Research methods

Eligible patients will be randomly divided into Group A, B, C. 98 cases in Group A, 115 cases in Group B and 110 cases in Group C. Each group was treated with the united therapeutic regimen "adjust blood sugar, diet, exercise, drug therapy and salmon calcitonin," and give them salmon calcitonin 50iu each time, hypodermic injection, with the different application plan of salmon calcitonin. Group A, daily treatment for 15 days; Group B once every two days for 30 days; Group C, once every three days for 90 days. It shouldn't be more than 6 months for clinical observation.

Outcome measures

To total the efficiency after comparing the improvement before and after the treatment; bone mineral density before and after treatment are calculated by T values; to total fracture incidence, etc., to assess the therapeutic effect; to compare the incidence of side effects to assess the circumstances after quitting the treatment and include it into treatment wastage to evaluate compliance.

Evaluation method

Setting up mathematical model of each groups' related data and carry out chi-square test, correspondence analysis and variance analysis to synthetically analyze each groups' results. P<0.05 was significantly considered in statistics.

RESULTS

The relationship between treatment programs and efficiency are as below in table 1. All patients completed the treatment programs are 248case.The difference was significant and it can be considered that efficient treatment programs are associated with efficiency.

Table 1: The efficiency and treatment programs

	Treatment Programs			
	A	B	C	Total
Observed cases	80	86	82	248
Valid cases	53	74	74	201
Efficiency	66.3%	86.1%	88.1%	

The results from multiple correspondence analysis chart displayed Group B and C had a higher efficiency. Comparing pair wise using fourfold table, efficiency of Group B&C were significantly higher than that of Group A (P<0.01) while there are no difference between B and C (P>0.05). BMD T-score (table 2) displays that the bone

density changes in Group B and C are significantly higher than Group A (P<0.01). It indicate that the salmon calcitonin injection method have influence in improving bone mineral density values. Comparing pair wise using fourfold table, it displays that the improvement of Group C is higher than that in Group B and Group B is higher than Group A, that is to say, they have significant difference in statistics.

Table 2: Treatment programs and bone mineral density change

T values increased	Treatment Programs		
	A	B	C
	1.3±1.0	2.5±1.8	4.5±1.0

Fracture incidence results are as follow in table 3: Comparing pair wise using fourfold table, the fracture incidence of Group A was significantly higher than B (P<0.01) and while there is no significant difference between group B and C.

Table 3: Treatment programs and fracture incidence

	Treatment Programs			
	A	B	C	Total
Complete treatment	80	86	82	248
One fracture	4	2	2	8
Two or more fractures	2	1	1	1
Fracture incidence	7.5%	3%	3.3%	

Table 4: Treatment programs and the turnover rate

	Treatment programs		
	A	B	C
Complete treatment	80	86	82
Loss of object	18	29	28
Total	98	115	110
Turnover rate	18.4%	25.2%	25.8%

The relationship between treatment programs and turnover rate are displayed in table 4, the turnover rate of group A was significantly lower than Group B and C (P<0.01), and there is no difference between the latter two group, which showing that there exists significant difference among the three groups in overall turnover rate. Comparing pair wise using fourfold table further, it can be drawn that group A is significantly lower than group B table 4 Treatment programs and the turnover rate and C there is no difference between Group B and C. Treatment programs and side effects: The main side effects are nausea, vomiting, facial flushing, dizziness, but after adjusting to the shoulder subcutaneous injection site, postprandial injection, patients can adhere to the application, no other drugs and side effects, side effects of the three groups' occurrence rates are 10.2%, 9.6% and 9.8%, the difference is not statistically significant.

DISCUSSION

It shows in Song's study that salmon calcitonin can prevent bone loss and increase bone mass in treating menopause osteoporosis patients (Song *et al.*, 2011). Chen studied that calcitonin can reduce clinical symptom of the again fracture rate of elderly osteoporosis fracture patients (Chen *et al.*, 2014). Wang studied that calcitonin can lighten the clinical symptom (Wang Hongwu *et al.*, 2003). This study shows that it is effective with comprehensive treatment of diet, exercise, calcium combined vitamin D and salmon calcitonin to elderly women with Type 2 diabetes mellitus and osteoporosis, and the results are close to the mentioned Song's, Chen's and Wang's study results. However, this study has a further discussion on the application plan of salmon calcitonin. From symptom improvement effect, the difference of salmon calcitonin usage brings the corresponding difference in clinical effects: the efficacy of daily treatment for 15 days is lower, once every two days for 30 days and once every three days for 90 days are better. From treatment compliance, the application of a salmon calcitonin daily treatment for 15 days has lower turnover rate, once every two days for 30 days and once every three days for 90 days has higher turnover rate. This study shows that if the time of salmon calcitonin treatment is too short, there will arise attenuation in effect; on the contrary, maybe some patients will discontinue the treatment. Evaluating synthetically, the joint program about "adjust blood sugar + diet + exercise + drug+salmon calcitonin therapy", salmon calcitonin, 50 iu each time, hypodermic injection, once every three days for three months is a more reasonable solution.

CONCLUSION

This study shows that the united plan "adjust blood sugar + diet + exercise + drug+salmon calcitonin therapy" has a better curative effect in treating elderly women with type 2 diabetes mellitus combined osteoporosis disease. Salmon calcitonin, 50 iu each time, hypodermic injection, once three days, for a course of three months is a comparatively reasonable plan. This study invests the different application course of salmon calcitonin elementarily and it has innovativeness in selecting the topic. Nevertheless, it deserves a further investigation of the long-term curative effect, side effect and the best solution in elderly women with type 2 diabetes mellitus combined osteoporosis.

REFERENCES

- Shirwaikar A, Kamariya Y, Patel B, Nanda S, Parmar V and Khan S (2011). Methanol extract of the fruits of morinda citrifolia linn., Restores bone loss in ovariectomized rats. *Int. J. Pharm. Pharmaceul. Sci.*, **7**: 446-454.
- Chen bao, Chen guo-jun and Gong sui-liang *et al* (2014). Application of calcitonin for the treatment of unstable intertrochanteric fractures in elderly patients. *Ch. J. Orthopedic.*, **1**: 24-28.
- Cruber HE, Lvey JL and Baylink *et al* (1984). Long-term calcitonin therapy in postmenopausal osteoporosis. *J. Metabolism*, **33**: 295-303.
- Pooneh Salari and Mohammad Abdollahi (2011). A comprehensive review of the shared roles of inflammatory cytokines in osteoporosis and cardiovascular diseases as two common old people problem; Actions toward development of new drugs. *Int. J. Pharm. Pharmaceul. Sci.*, **7**: 552-567.
- Pooneh Salari Sharif and Mohammad Abdollahi (2011). A systematic review on the relation between use of statins and osteoporosis. *Int. J. Pharm. Pharmaceul. Sci.*, **7**: 180-188.
- Song li-ge, Meng xiang-jun and Xuan ying-li *et al* (2011). Changes in bone mineral density and bone turnover in postmenopausal osteoporotic patients treated with salmon calcitonin nasal spray. *Ch. J. Endocrinology and Metabolism*, **2**: 106-109.
- Wang hong-wu, Gu jin-lian and Wu xin-da *et al* (2003). Observation of senile osteoporosis treated by calcitonin. *Ch. J. Geriatrics*, **6**: 345-347.
- Www.ema.europa.eu, 2012, 2013. Questions and answers on the review of calcitonin-containing medicine [EB/OL].(2012-07-19)[2013-12-19]. http://www.ema.europa.eu/docs/en_GB/document-library/Referrals-document/calcitonin-31/WC500130149.pdf
- Zhu han-min, Liao er-yuan (2013). Salmon calcitonin seminar Report. *Ch. J. Osteoporosis and Bone Mineral Research*. **6**(4): 370-372.
- Zhao wei, Zhang hong and Zhu Wen-juan *et al* (2008). Association between bone mineral density and macrovascular complication in postmenopausal women with type 2 diabetes. *Int. J. Endocrinology and Metabolism*, **28**(3): 210-212.