

論文の内容の要旨

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論文題目 Effects of a micro-thread at the implant neck on securing the quantity and quality of bone formation around implants (インプラント体の頸部マイクロスレッド形状は同部の新生骨量/骨質に影響を及ぼす)	
(論文の内容の要旨) Background and Objective Implant therapy is regarded as a safe and reliable method for patients with complete or partial edentulism. While current survival rates of modern titanium implants exceed 95% during a period of 5 years, the success in elderly and compromised patients is significantly lower. The main causes of implant failure have two main reasons, biological and mechanical failure. Quantity and quality of bone supporting dental implant is one of key factors which influence implant success. Many studies have shown that the surface geometry and surface roughness could influence implant success rate. However, there has been few studies that evaluate the effect of different implant neck designs on bone formation. Therefore, the aim of this study was to examine the effect of different implant neck design on securing quantity and quality of peri-implant hard tissue after implant placement by histomorphometric analysis. Material and Methods Three types of endosseous titanium implants with different neck morphologies but the same blast surface (no thread, macro-thread, and micro-thread) were used in this study. Implants were placed in the femur and tibia of the rabbits; one implant in the distal femoral condyle and two implants in the proximal tibial metaphysis alternatively. Thirty-six implants were placed in 6 rabbits. Under general anesthesia induced by 3% pentobarbital (30 mg/kg/i.v.; Somnopentyl; Kyoritsu Seiyaku, Japan) and 2% lidocaine (1 ml i.m.; AstraZeneca, Osaka, Japan), all implants were placed at 35 Ncm following the manufacturer's guidelines with a 2.5-mm final drill and primary close sutures. After 3 and 8 weeks, animals were sacrificed and subjected to Imaging study and histological study. For the imaging study, on micro CT images, trabecular number, trabecular thickness, and trabecular separation were evaluated by the image pro software. For the histological study, the samples were divided into undecalcified samples and decalcified samples. undecalcified samples come from tibia and decalcified samples come from femur. For undecalcified sections, stained by Toluidine blue, the percentage of bone to implant contact (%BIC) and the percentage of new bone area (%NBA) were evaluated. For decalcified sections, anti-osteopontin antibody and anti-osteocalcin antibody staining was executed, osteoblast count was evaluated.	

Results

1. Radiological analysis

Three weeks after implantation, type C had significantly higher mean values for TBN and TBT than type A or B. Regarding TBS, type C had a significantly lower mean value than type A or B. After 8 weeks, type C showed higher mean values for TBN and TBT as well as a lower mean value for TBS than type A or B, and the differences in TBN and TBT between types B and C and in TBS between types A and C were significant.

2. Histological analysis

Three weeks after implantation, Type C showed significantly higher mean %BIC as well as %NBA than type A or B. At 8 weeks, type C showed higher mean values for %BIC and %NBA than type A or B, and the difference in %NBA between types A and type C was significant.

3. Immunohistochemical analysis

Three weeks after implantation, type C had more positive cells for osteopontin and osteocalcin than type A or B. Eight weeks after implantation, type C still had more positive cells for osteocalcin than the other two types. However, the number of samples for immunohistochemical staining (n=2) was too small for a statistical analysis between the types.

Conclusion

The results of the present study suggest that an implant with a micro-thread at the implant neck promotes faster osteogenesis and a greater amount of new cortical bone around the implant. A microthread at the implant neck contributes not only to reducing peri-implant bone loss, but also promoting osteogenesis around the implant.