Funding/support: This work was supported by NSFC No.81301567 and Shenzhen Science and Technology Research Funding (CXZZ20140901004122089).

Subjects and Methods

Possible mechanism. We observed the influence of FGFR2 on calvarial defect healing and discuss the possible mechanism. To establish the calvarial defect model, we induced gain-of-function mutation of FGFR2 (inducing expression P253R mutation) in adult mice, and through establishing of calvarial defect model, we speculated FGFR2 may participate in the regeneration process after calvarial defect healing. The proliferation and differentiation of FGFR2P253R/+ osteoblasts were accelerated. The expressions of bone formation markers such as Runx2, Coll1 and OP were increased, and the activity of ERK1/2 pathway was enhanced in FGFR2P253R/+ osteoblasts. mRNA levels of canonical Wnt/β-catenin pathway genes Dvl2, Tcf1 were increased in FGFR2P253R/+ osteoblast cells. FGFR2 accelerates the proliferation of osteoblast cells, and promotes the differentiation of osteoblasts by up-regulating Runx2 and partially through ERK1/2 MAPK pathway. FGFR2 accelerates osteoblasts differentiation partly by activating the canonical Wnt/β-catenin signaling pathway.

http://dx.doi.org/10.1016/j.jot.2016.06.141

418

ROLE OF FGFR2 IN CALVARIAL DEFECT HEALING

Wei Xu, Yangli Xie, Fengtao Luo, Siru Zhou, Zuqiang Wang, Junlan Huang, Xianling Sun, Lin Chen
Daping Hospital, Third Military Medical University, China

Introduction: FGFR2 is an important member of the FGFRs family, many studies have shown that FGFR2 plays an important role in bone development. Calvarial defect healing is a complicated regeneration process which to some degree recapitulates the skull development. Many molecules involved in skull development also play important roles during calvarial defect healing such as Wnts, FGFs, BMPs, etc. Given that FGFR2 plays an important role in skull development, we speculate FGFR2 may participate in the regeneration process after calvarial defect, but its specific function and related mechanism are not clear. So, we induced gain-of-function mutation of FGFR2 (inducing expression P253R mutation) in adult mice, and through establishing of calvarial defect model, we observe the influence of FGFR2 on calvarial defect healing and discuss the possible mechanism.

Subjects and Methods: Calvarial defects were established in FGFR2P253R/+ mice. Micro-CT was used to dynamic observation the healing process 2 weeks, 4 weeks, 8 weeks after calvarial defect and defect healing area were also quantitatively measured. H&E staining was used to observe new bone formation around defect edge 8 weeks after calvarial defect. Quantitative PCR was used to detect mRNA levels of Runx2, Coll1, OP, OC 2 weeks after calvarial defect. Osteoblast cell culture was used to examine the role of FGFR2 on osteoblast proliferation and differentiation. The protein level of phosphorylated ERK1/2 was detected by western blot, the mRNA levels of canonical Wnt/β-catenin pathway genes Dvl2,β-catenin, Tcf1 in osteoblast cells were detected by quantitative PCR.

Results: Micro-CT and HE staining results show that FGFR2P253R/+ mice have accelerated defect healing ability. The proliferation and differentiation of FGFR2P253R/+ osteoblasts were accelerated. The expressions of bone formation markers such as Runx2, Coll1 and OP were increased, and the activity of ERK1/2 pathway was enhanced in FGFR2P253R/+ osteoblasts. mRNA levels of canonical Wnt/β-catenin pathway genes Dvl2, Tcf1 were increased in FGFR2P253R/+ osteoblast cells.

Discussion and Conclusion: FGFR2 promotes calvarial defect healing. FGFR2 accelerates the proliferation of osteoblast cells, and promotes the differentiation of osteoblasts by up-regulating Runx2 and partially through ERK1/2 MAPK pathway. FGFR2 accelerates osteoblasts differentiation partly by activating the canonical Wnt/β-catenin signaling pathway.

http://dx.doi.org/10.1016/j.jot.2016.06.140

423

THE INDIVIDUALIZED CORRECTION OF THE SECONDARY DEFORMITIES POST-TRAUMATIC PHYSEAL BAR OF DISTAL TIBIA

Qingda Lu *, Xiong Zhao *, Xiaolei Zhao *, Long Sun, Wei Lei, Qiang Jie XiJing Hospital, The Fourth Military Medical University, China

Objective: Distal tibia physeal injury had a high incidence of physeal arrest. There was secondary deformity tends to have a disturbance on the development and function of the limb. The purpose of the study was to evaluate the treatment of the children patients with the secondary deformities post-traumatic physeal bar of distal tibia.

Methods: A retrospective study of distal tibia premature physeal arrest with deformity of 16 patients in our institution between January 2008 and October 2014. With analysis of the radiographic findings of physeal arrest, we try to classify the deformity into four Type. And those also was evaluated in two duration with shorten of the limb or not. We made the surgical plan based on the classification, and divided the patients into 2 group. Patients in group 1 were treated with physeal bar resection, filled the defect with fat and done osteotomy on the distal tibia furthermore. While patients in group 2 were treated with arthrodesis of ankle and limb lengthening. In group 1 there were 6 boys and 5 girls, aged 5–13 years (mean, 10.8 years), 8 left and 3 right. There were 4 boys and 1 girl in group 2, aged 10–15 (mean, 12.7 years), 3 left and 2 right. There was 3–6 months (mean, 4.8 months) spent on limb lengthening with external fixation, and the lengthening length was 3–6.5 cm (mean, 4.2 cm).

Results: A surgical procedure was successfully created in all the children, mean follow-up was 14.9 months (range, 6–24 months). All the children had an obvious improvement with the function and appearance in the last follow-up. There were 10 children had satisfactory results and 3 had minor loss of correction, however, 3 occurred deformity recurrence and 1 need revision. According to the Johner–Wruhs score scale in the last follow-up, there were 10 excellence, 2 good, 2 mid and 1 bad.

Conclusion: Autogenous fat graft had a good efficiency to fill into the defect after physeal bar resection. Currently, the premature partial closure of the physis mainly classified according to the size and position of physeal bar, and there are still insufficient to evaluate the clinical work. So we try to propose a new classification and staging method to evaluate the premature partial closure of the physis based on the secondary deformities. The growth arrest of lower limb caused by physeal bar were complex, a reliable and individualized method should be used.

* QDL, XZ and XLZ contributed equally to this work as co-first authors.

http://dx.doi.org/10.1016/j.jot.2016.06.204