

## Growth and Bone Health in Children following Liver Transplantation

**Authors :** Faris Alkhalil, Rana Bitar, Amer Azaz, Hisham Natour, Noora Almeraikhi, Mohamad Miqdady

**Abstract :** Background: Children with liver transplantation are achieving very good survival and so there is now a need to concentrate on achieving good health in these patients and preventing disease. Immunosuppressive medications have side effects that need to be monitored and if possible avoided. Glucocorticoids and calcineurin inhibitors are detrimental to bone and mineral homeostasis in addition steroids can also affect linear growth. Steroid sparing regimes in renal transplant children has shown to improve children's height. Aim: We aim to review the growth and bone health of children post liver transplant by measuring bone mineral density (BMD) using dual energy X-ray absorptiometry (DEXA) scan and assessing if there is a clear link between poor growth and impaired bone health and use of long term steroids. Subjects and Methods: This is a single centre retrospective Cohort study, we reviewed the medical notes of children (0-16 years) who underwent a liver transplantation between November 2000 to November 2016 and currently being followed at our centre. Results: 39 patients were identified (25 males and 14 females), the median transplant age was 2 years (range 9 months - 16 years), and the median follow up was 6 years. Four patients received a combined transplant, 2 kidney and liver transplant and 2 received a liver and small bowel transplant. The indications for transplant included, Biliary Atresia (31%), Acute Liver failure (18%), Progressive Familial Intrahepatic Cholestasis (15%), transplantable metabolic disease (10%), TPN related liver disease (8%), Primary Hyperoxaluria (5%), Hepatocellular carcinoma (3%) and other causes (10%). 36 patients (95%) were on a calcineurin inhibitor (34 patients were on Tacrolimus and 2 on Cyclosporin). The other three patients were on Sirolimus. Low dose long-term steroids was used in 21% of the patients. A considerable proportion of the patients had poor growth. 15% were below the 3rd centile for weight for age and 21% were below the 3rd centile for height for age. Most of our patients with poor growth were not on long term steroids. 49% of patients had a DEXA scan post transplantation. 21% of these children had low bone mineral density, one patient had met osteoporosis criteria with a vertebral fracture. Most of our patients with impaired bone health were not on long term steroids. 20% of the patients who did not undergo a DEXA scan developed long bone fractures and 50% of them were on long term steroid use which may suggest impaired bone health in these patients. Summary and Conclusion: The incidence of impaired bone health, although studied in limited number of patients; was high. Early recognition and treatment should be instituted to avoid fractures and improve bone health. Many of the patients were below the 3rd centile for weight and height however there was no clear relationship between steroid use and impaired bone health, reduced weight and reduced linear height.

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