Ultrasound technique monitoring the lengthening of Magnetically Controlled Growing Rods

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Neuromuscolar deformity

- Inverse relationship between pulmonary function test score and severity of scoliosis
- For every 10° increase in Cobb angle, there is 4,7% decrease in predicted vital capacity and 3,3% decrease in peak flow.

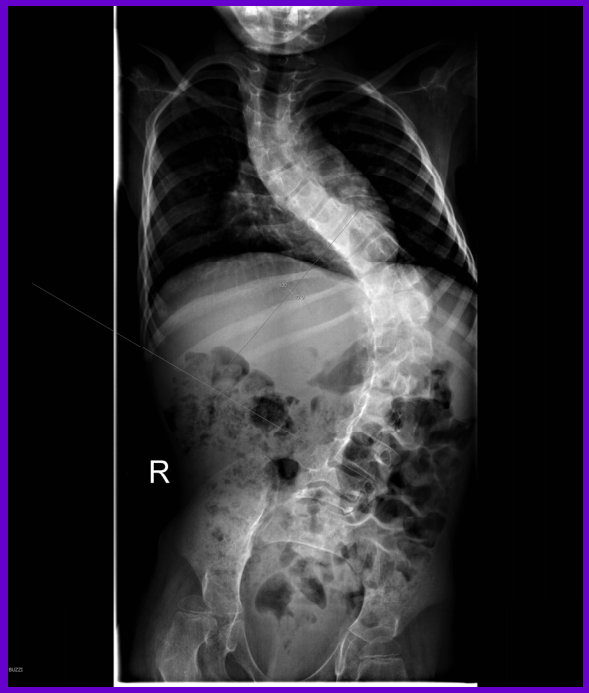
- (Robinson D, Galasko CS, Delaney C, Williamson JB, Barrie JL, : Scoliosis and lung function in spinal muscolar atrophy. Eur.Spine J 1995; 4 (s): 268-73

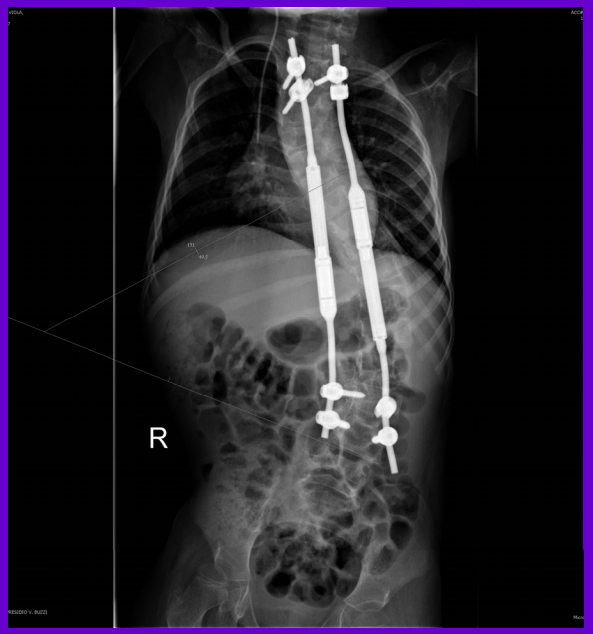
Neuromuscolar deformity

- Bracing is ineffective in halting curve progression and is poor tollerated for the limitation of chest wall excursion
- Surgical intervention before skeletal maturity is often indicated, but early fusion limits trunk height and may exacerbated the pulmonary difficolties that are already a primary concern
- Children undergo spinal fusion before 8 years of age has the worst Quality of life with different test
  (M. Vitale M. D. Children H. N.Y pres. ICEOS SRS 2007)
- This dilemma raises questions about the best method of controlling the large curves during an extended period of growth

Method

- Since November 2012 we have treated with magnetically growing rod 8 children affected by neuromuscular scoliosis , 6 (SMA II) , 2 Myopathy . mean age 6 years
- Each implant was done with 2 rods submuscolar tunnelled fixed with hybrid construct pedicular screw hook and sublaminar wire



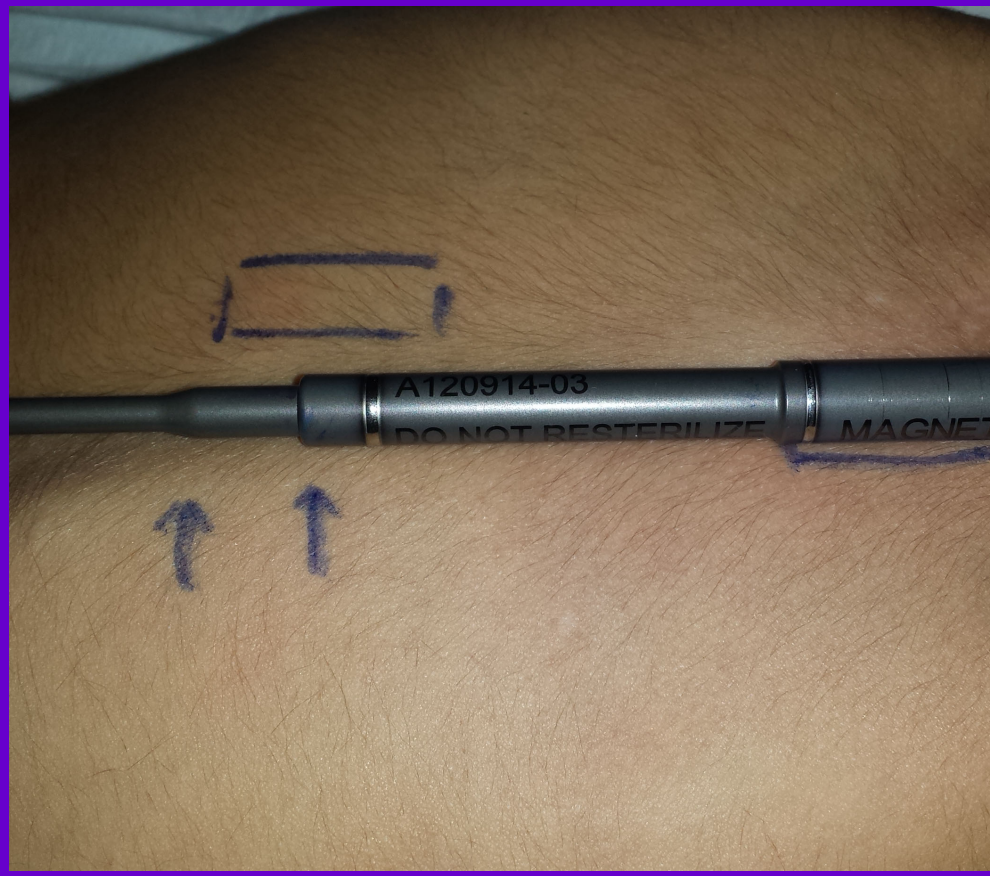


Ptient 5 y.o. affected by SMA

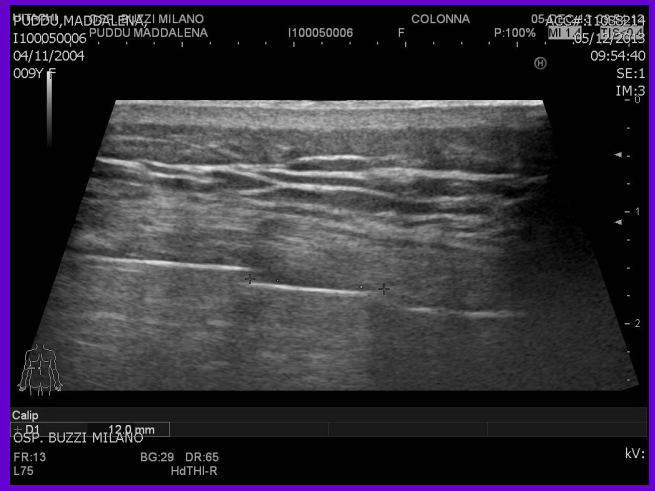
Planning of the lengthening

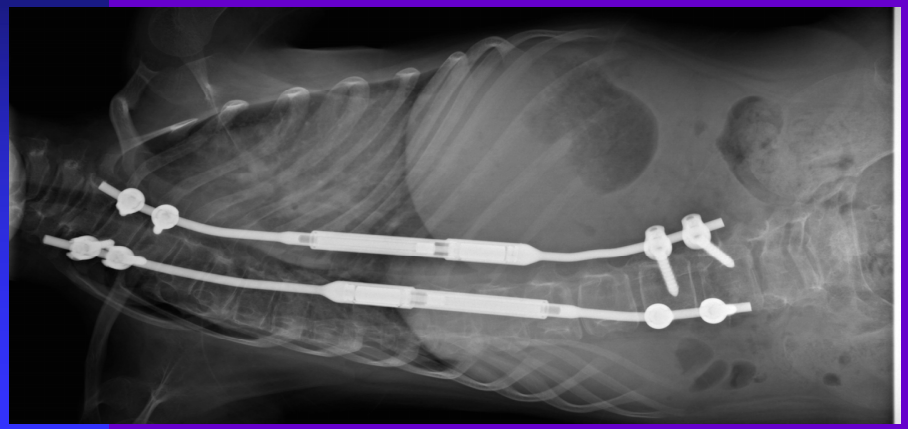
- According with Akbarnia ,patients lengthened at intervals of less than 6 mounth had higher annual growth
- And following the indications of A. di Meglio that showed there is a reduced growth phase between 5 to 10 years
  (1,2 -1.5 cm per year)
- We decided on lengthening intervals of 3 mounth with distraction approximately of 3,5 mm
- These raises the problem that we expose the children to excessive x ray control
- So we start monitoring the lengthening with ultrasound since november 2013

Ultrasound technique



We compare the data of the lengthening





Ultrasound technique

- We use high frequency linear transducer 14 MhZ
- We have done 12 lehgthening comparing the data and the mismatch between US and Remote cont. Was <0.3 mm
- The duration of the exam now it takes

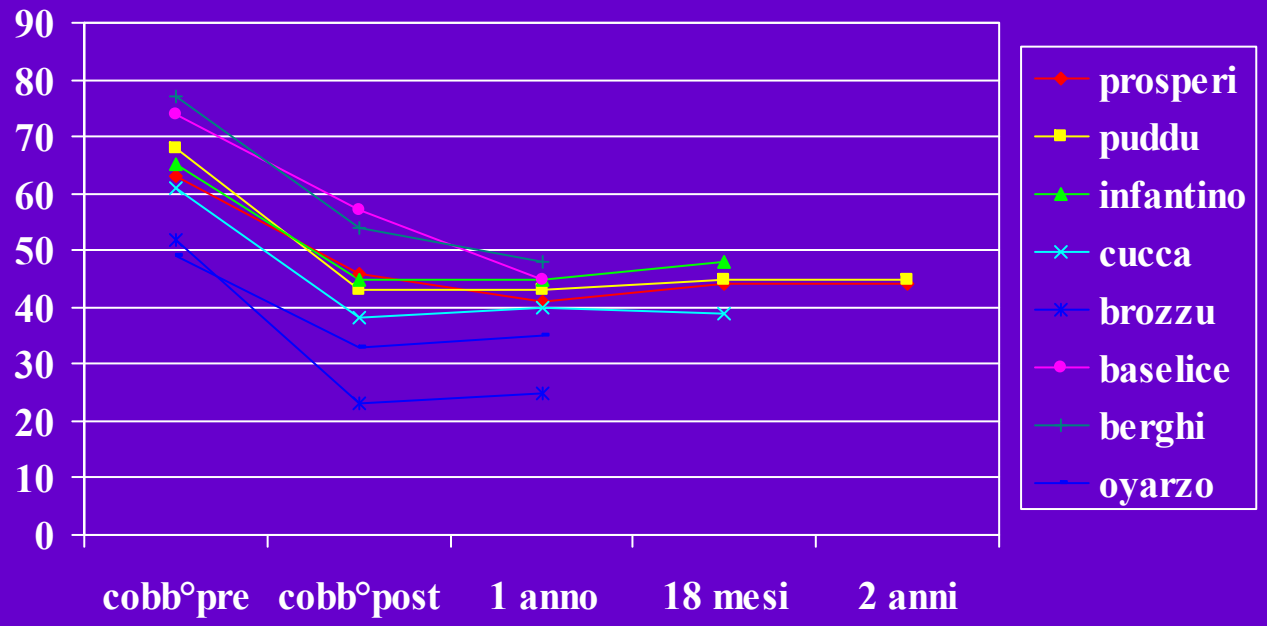
  10 /15 min. with the magnetic lenghtening.

RESULTS

X RAY Cobb angle measurment

Pre OP. 74° < 58°

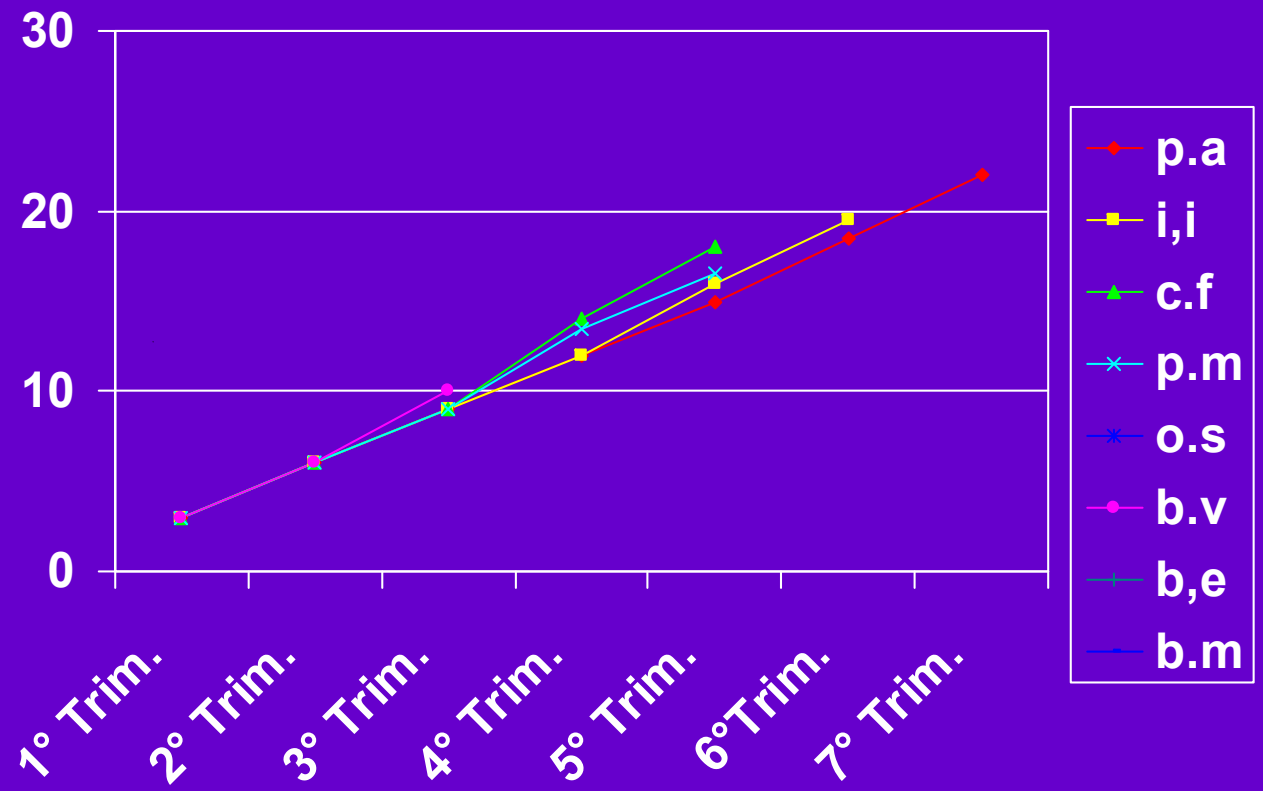
Post Op 47° <23° mean correction 60%



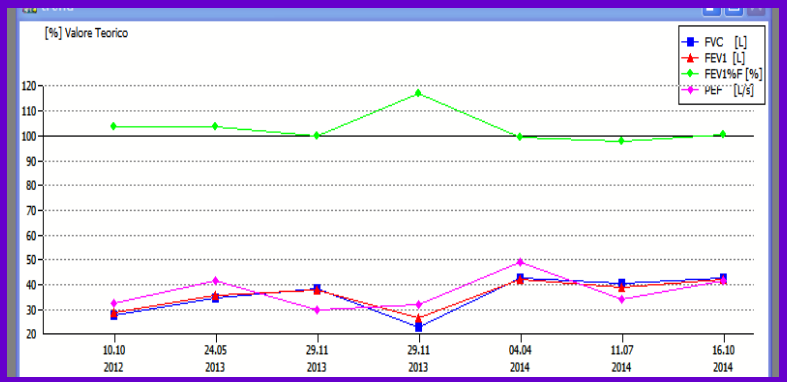
Lengthening each 3 mounth

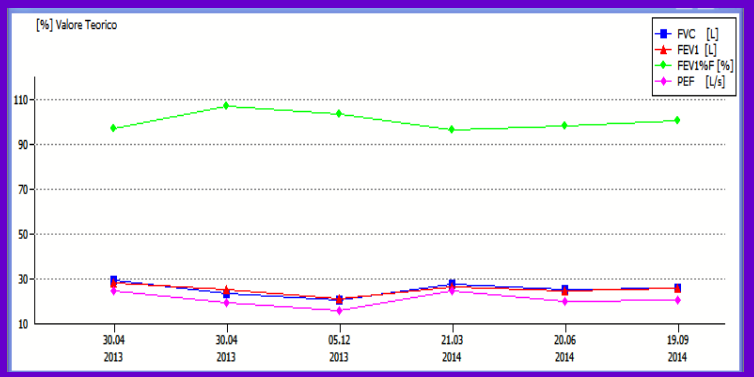
We have done 64 procedure

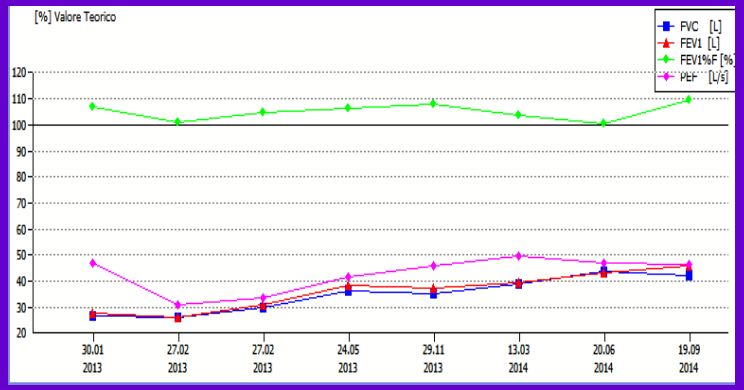
min lenghtening 2.5 mm max 8.0 mm mean 3.2

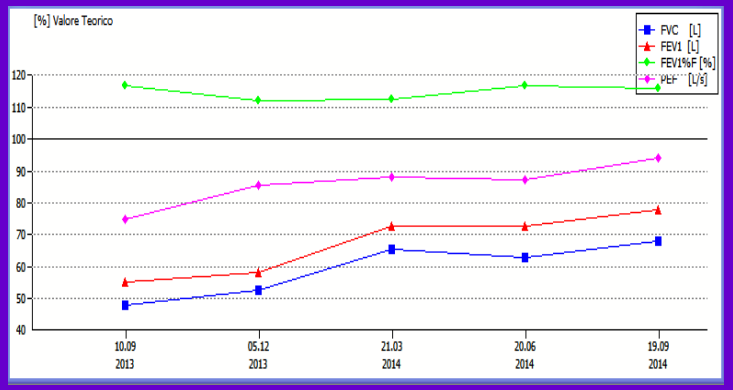


PFT we mesured FVC +FEV1 pre op and every each lengthening



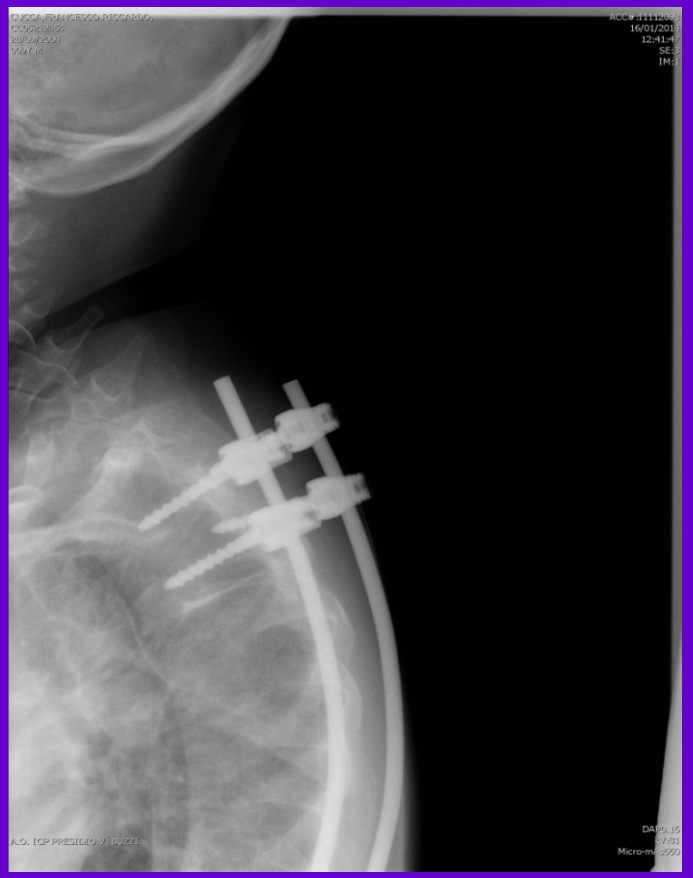






Complication

- One incomplete pull out of a pedicle screw in T2 now stable
- One rod disfunction



Pre post Surgery .
After 6 mounth we gave a subjective questionnaire

Conclusion

- In this first two years we don't have problem with the lengthening of the MCGR and thanks the ultrasound monitoring we expose the children to the x ray just ones in a year . With this instrumentation we reduced the morbidity and the complications avoiding the surgery time for the lengthening .


Thanks