

Pulmonary function evaluation in children affected by neuromuscular scoliosis treated for the spine deformity with Magnetically Controlled Growing Rods



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Ospedale dei Bambini
“V.Buzzi” Milano

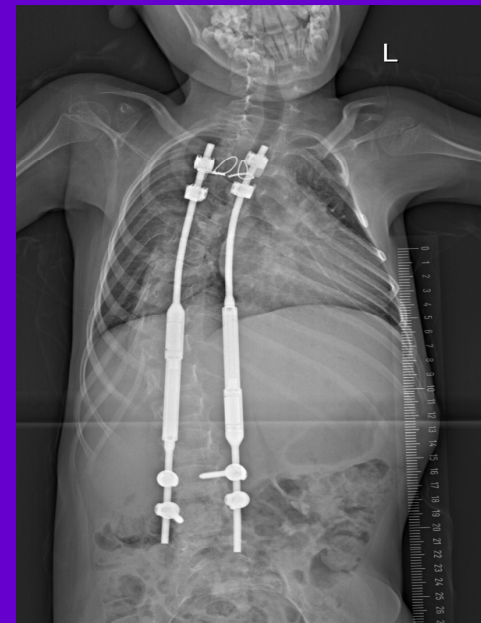
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Neuromuscular deformity

- Bracing is ineffective in halting curve progression and is poorly tolerated for the limitation of chest wall excursion
- Surgical intervention before skeletal maturity is often indicated, but early fusion limits trunk height and may exacerbate the pulmonary difficulties that are already a primary concern
- Children who undergo spinal fusion before 8 years of age have the worst Quality of Life with different tests (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 10 children affected by neuromuscular scoliosis , 7 (SMA II) , 3 Myopathy . mean age 6 years
- Each implant was done with 2 rods submuscular tunnelled fixed with hybrid construct pedicular screw hook and sublaminar wire



Patient 6 y.o. affected by SMA

Planning of the lengthening

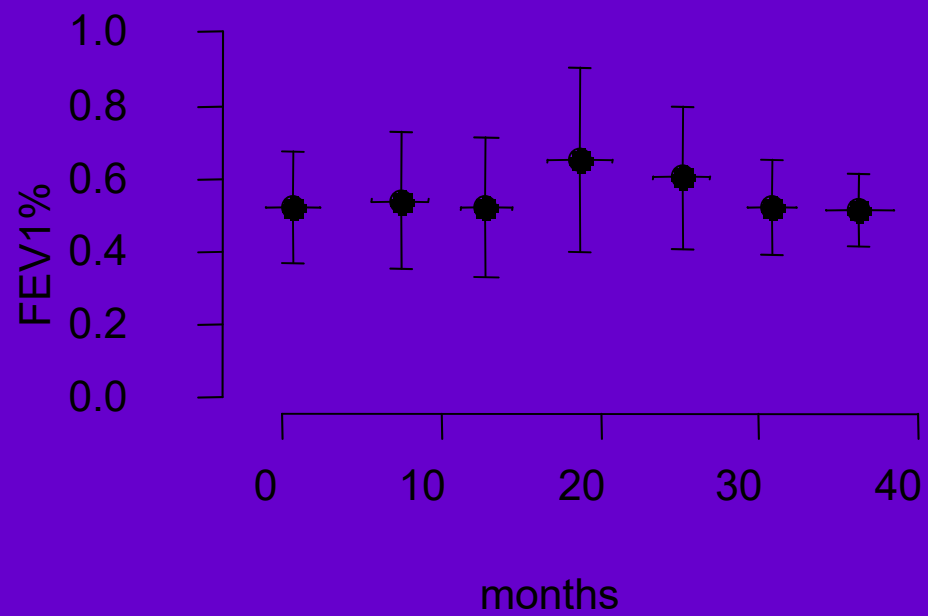
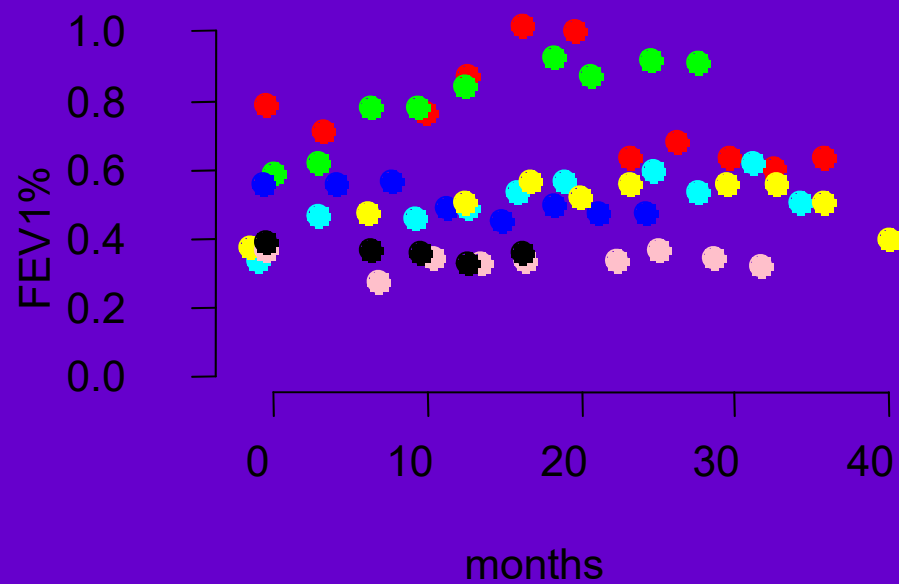
- According with Akbarnia ,patients lengthened at intervals of less than 6 month had higher annual growth
- And following the indications of A. di Meglio that showed there is a reduced growth phase between 5 to 10 years (1,2 -1.5 cm per year)
- We decided on lengthening intervals of 3 month with distraction approximately of 3,5mm ultrasound monitoring

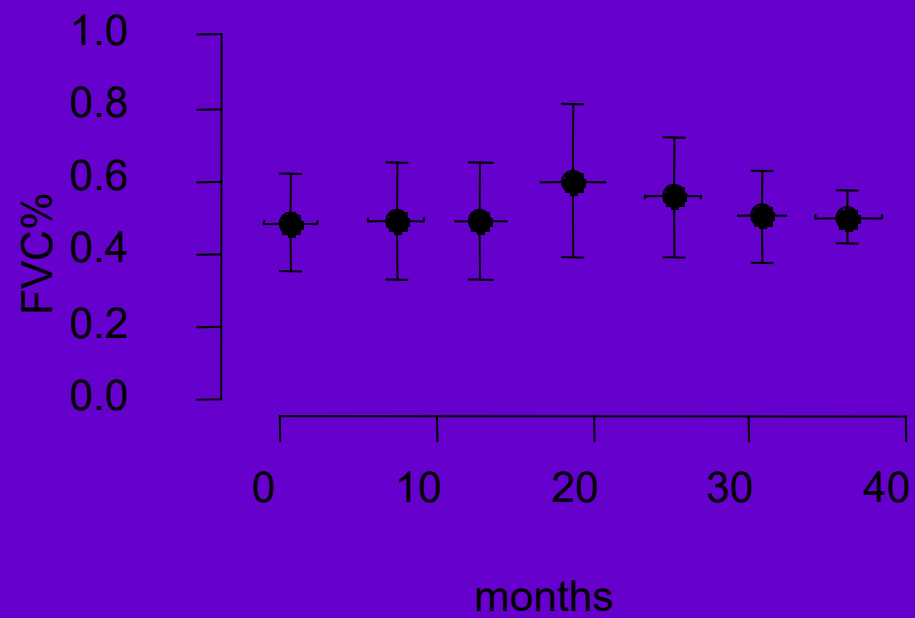
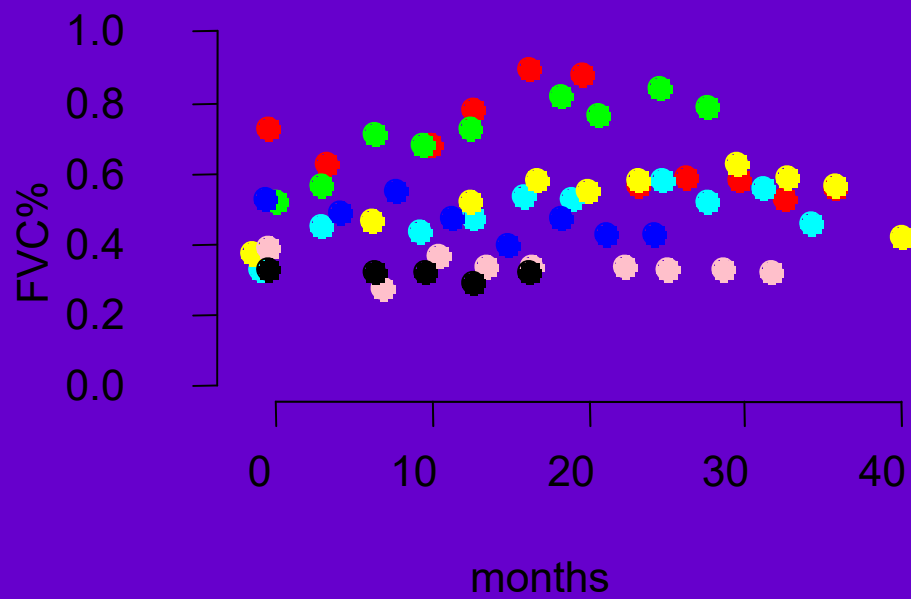
Method

- Patients performed a spirometry each lengthening.
- We matched data with a group of children affected by neuromuscular scoliosis (6 by SMA II and 2 by metabolic myopathy mean age 6 y in conservative treatment (control group)).

Results

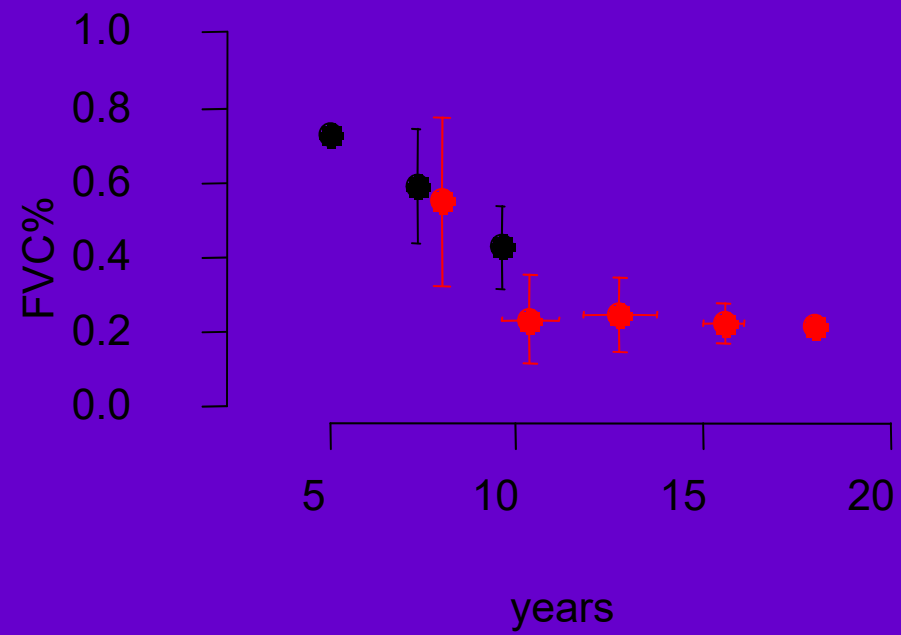
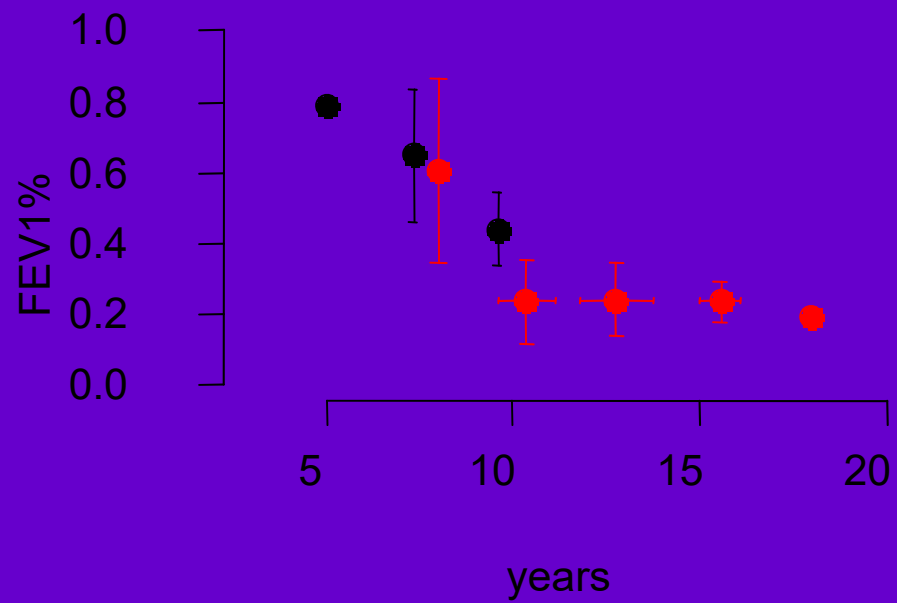
- All children showed at each timepoint a restrictive pulmonary pattern at spirometry. After implantation of MCGR, the pulmonary function stopped worsening: with lengthening following the protocol described, the forced vital capacity (FVC) (one-way ANOVA, $p=0.42$) and the forced expiratory volume in the first second (FEV1) (one-way ANOVA, $p=0.63$) did not further decrease

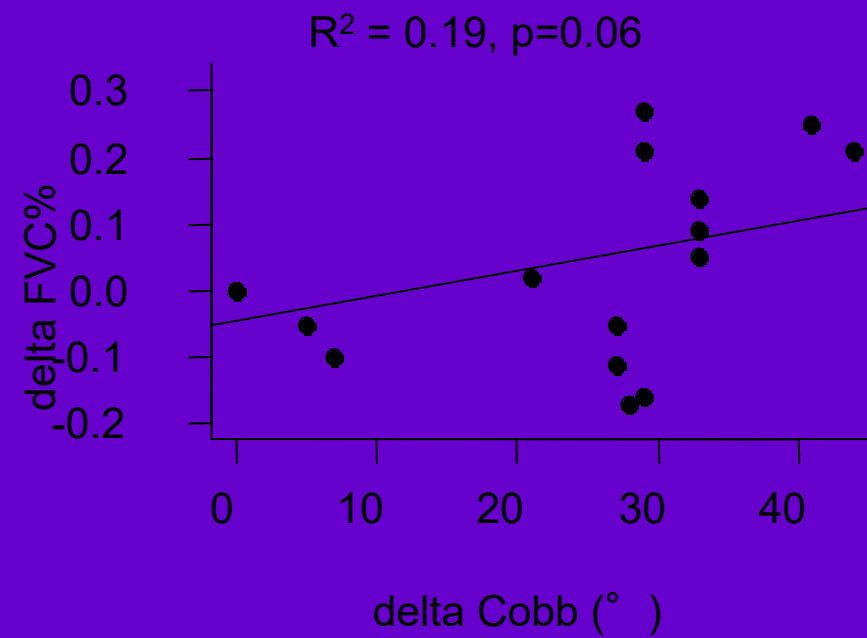
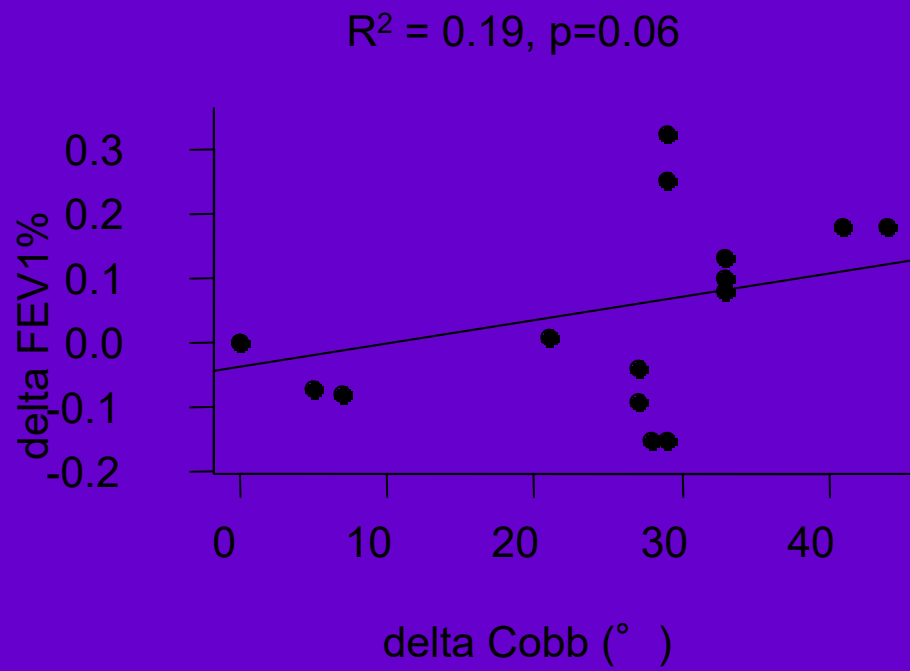


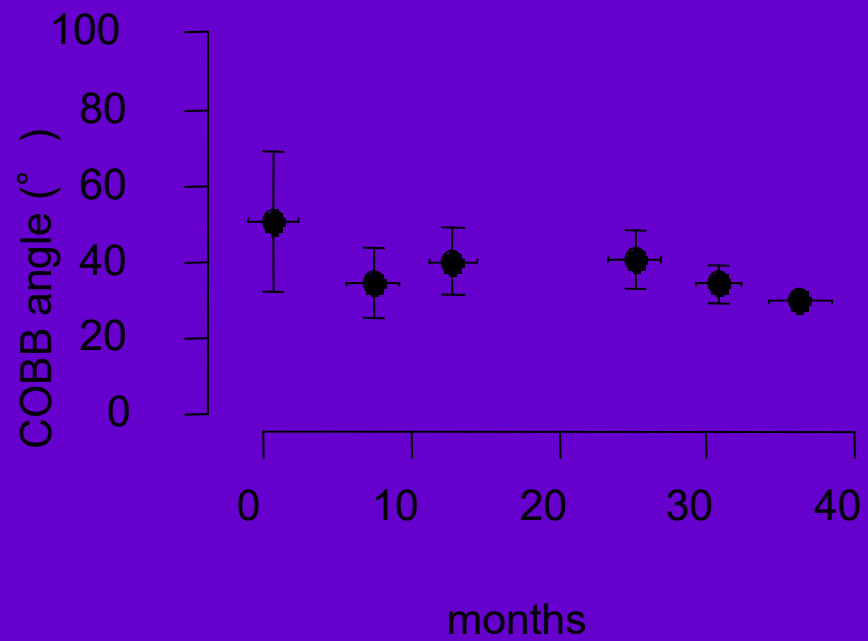
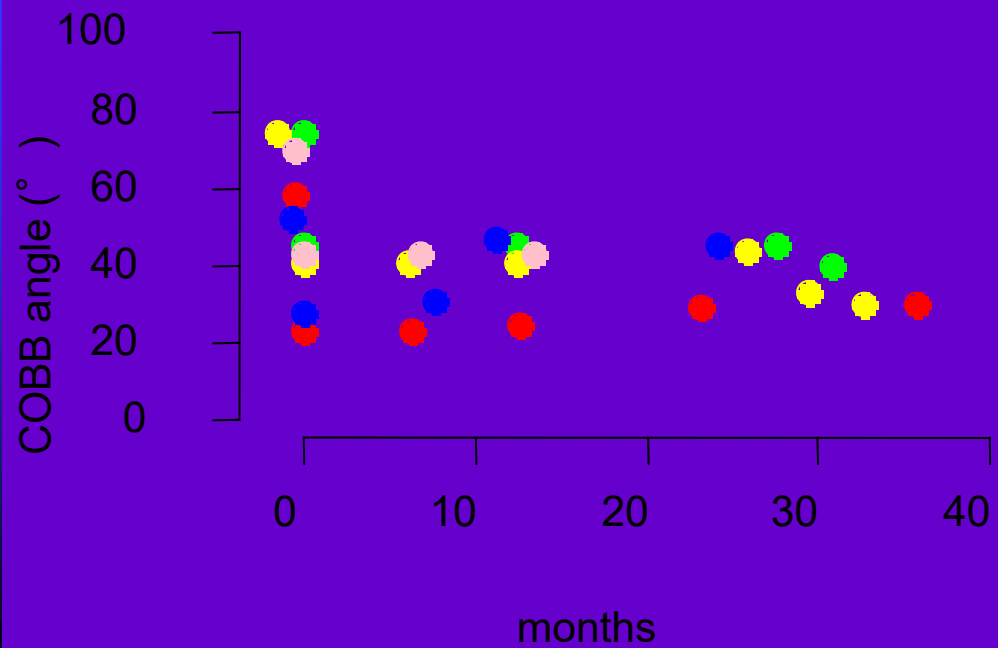


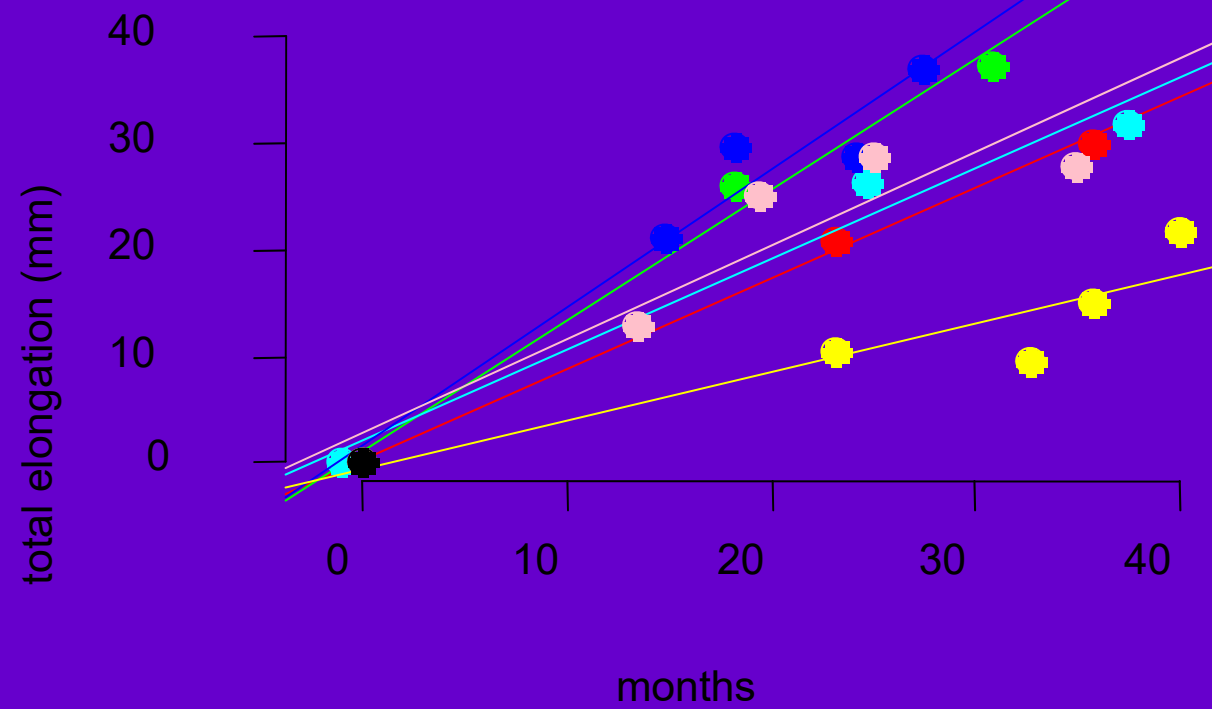
Results

- Comparing data between children treated with MCGR and control group, at the same age, we observed an higher FEV1 (age-class 3, 44% vs 24%, $p=0.04$) and FVC in treated group (age-class 3, 43% vs 24%, $p=0.04$) (Figure1: black points MCGR group, red points control group).









Pre post Surgery



Conclusion

- In this first four 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 the psicological impact and complications avoiding the surgery time for the lengthening .
- We found a better pulmonary function in children after MCGR compared to control group with the same pathology in conservative treatment

A photograph of a children's museum entrance. The building has a red facade with large arched murals of a giraffe, an elephant, two parrots, and a monkey. A blue pergola structure is on the right. In the foreground, there are three circular planters with green bushes on a paved area. Black stanchions are lined up on the left. The word "Thanks" is written in orange text at the bottom.

Thanks