



## Simultaneous MRI and Elective Surgery for Congenital Disorders in Children: Is it a Good Idea and What About the Risk of Anesthesia in Infants?

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### Commentary

Neurosurgery relies heavily on imaging findings to guide treatment especially in preparation for surgery. At our institution, Magnetic Resonance Imaging (MRI) of the spine in infants always require general anesthesia. We reviewed our series of patients who underwent simultaneous preoperative MRI and potential congenital spine surgery. Advantages of simultaneous MRI and surgery include convenience of single anesthesia and cost saving. We looked at our IRB approved retrospective series of 28 patients (mean age 14.5 months, range 0 to 47 months, 46% male) that were scheduled, 5 children did not undergo any surgery after the MRI. Six newborns underwent MRI followed by exploration of dermal sinuses. Ten toddlers underwent MRI of the lumbar spine under general anesthesia for evaluation of sacral/pilonidal pits/appendage and underwent excision of the pits/appendage. One of these patients developed Cerebrospinal Fluid (CSF) leak following excision of sacral pit by a general surgeon that required repair of CSF leak following MRI of the lumbar spine that did not show tethered cord. Six infants underwent spinal cord detethering due to either fatty filum or terminal lipoma; two of these infants had evidence of syringomyelia on MRI. One patient underwent MRI and repair of lipomyelomeningocele simultaneously who then developed postoperative CSF leak that required surgical repair twice. Calculated savings on base anesthesia charges was \$84,824.00. It appears to be reasonable to schedule simultaneous preoperative MRI of lumbar spine and surgery in simple pathologies such as dermal sinus and sacral/pilonidal pit. More complex defects such as spinal cord lipomas probably should undergo preoperative MRI before scheduling for surgery.

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Received Date: 05 Mar 2020

Accepted Date: 25 Mar 2020

Published Date: 28 Mar 2020

#### Citation:

Lin JJ. Simultaneous MRI and Elective Surgery for Congenital Disorders in Children: Is it a Good Idea and What About the Risk of Anesthesia in Infants?. *Clin Surg*. 2020; 5: 2786.

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The main factor considered here is the risk of anesthesia in infants as animal studies have found general anesthesia to be neurotoxic. Several recent randomized studies did not find any differences in terms of developmental outcome when compared to those children who were not exposed to general anesthesia. The most recent GAS trial concluded “that just under 1 h of general anesthesia in infancy does not cause significant neurocognitive or behavioral deficits” [1]. The average age of infants undergoing general anesthesia in the GAS trial was 2.36 mo with 54 min of average duration of anesthesia. The age in infant and the duration of anesthesia are important factors when considering when to operate infants electively. One particular type of case that comes to mind in pediatric neurosurgery is non-syndromic single suture synostosis. Current surgical options mainly include endoscopic vs. open approach at 3 mo vs. 6 mo when timing of surgery is considered. In a recent 16-year single centre experience of endoscopic surgery for nonsyndromic craniosynostosis, 235 infants “underwent minimally invasive endoscopic surgery for nonsyndromic craniosynostosis from 2000 to 2015. The median age at surgery was 3.8 months. The median operative and anesthesia times were 55 and 105 min, respectively” [2]. However, neurodevelopmental outcome was not reported which is not unusual since neurodevelopmental outcomes in craniosynostosis surgeries are somewhat lacking. Hashim et al. [3] found that patients who underwent whole-vault cranioplasty had higher intelligence quotient and achievement scores than those treated with strip craniectomy in a multicentre study. Obviously, there are numerous confounding factors in determining development outcomes in infants with neurological disorders including and not limited to pre-existing or underlying neurological problems, type of general anesthetic agents, subsequent exposures to general anesthesia, etc. Despite all the recent studies suggesting the safety of general anesthesia in infants, the US Food and Drug Administration continues to warn “that repeated or lengthy use of general anesthetic and sedation drugs during surgeries or procedures in children younger than 3 years or in pregnant women during their third trimester may affect the development of children’s brains.” In conclusion, general anesthesia is unavoidable in certain pediatric neurosurgical

procedures; however, delaying and minimizing exposures if possible, should be the goal.

## References

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