

Feasibility and outcome of sequential scoliosis surgeries in twins with adolescent idiopathic scoliosis (AIS): a report of two pairs of twins

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INTRODUCTION

Genetic predisposition in idiopathic scoliosis (IS) has been reported in the English literature.¹ It is not uncommon to have twins diagnosed with IS as higher concordance level of IS in monozygotic twins has been reported in the literature.^{2,3}

Scoliosis corrective surgery is a major operation, with an overall complication rate of 5.7% which often results in increased parental anxiety.⁴ Preoperative counselling is pivotal in deciding on same-day sequential surgeries versus separate-day surgeries for twin patients. We would like to share our experience and report the outcome of two pairs of adolescent idiopathic scoliosis (AIS) twins operated sequentially on the same day and the psychosocial impact on their parents.

CASE PRESENTATION

Case 1: First Pair of Twins

The first pair of twins had Lenke 1AN curves. The main thoracic (MT) Cobb angle of Twin 1 was 45°. She underwent posterior spinal fusion (PSF) T4-L1. The operative duration was 107 minutes, with blood loss of 600 ml and blood salvage of 376 ml.

Twin 2 had a MT Cobb angle of 51°. She underwent PSF T4-L1 on the same day after her twin sister's surgery with an operative duration of 85 minutes, estimated blood loss of 550 ml and blood salvage of 120 ml. She was discharged well together with her twin sister.

Both twins were discharged on postoperative day 3. Figure 1 shows the preoperative radiographs, postoperative radiographs, latest follow-up radiographs, preoperative clinical photographs and latest follow-up clinical photographs.

Case 2: Second Pair of Twins

Twin 1 presented with a Lenke 5CN curve with lumbar Cobb angle of 57°. She underwent PSF T10-L4. The operative duration was 97 minutes, with blood loss of 511 ml and blood salvage of 228 ml.

Twin 2 similarly had Lenke 5CN curve with lumbar Cobb angle of 55°. She underwent PSF T10-L4 on the same day as her twin. The operative duration was 126 minutes, with blood

loss of 664 ml and blood salvage of 283 ml. She was discharged well together with her twin at day 3 post-operation.

Figure 2 shows their preoperative radiographs, postoperative radiographs, latest follow-up radiographs, preoperative clinical photographs and immediate postoperative clinical photographs.

Both mothers shared their experience through phone call interview. Table I depicts further information of the detailed interview with them.

The aim of surgery in AIS is deformity correction and to prevent the worsening of the curve.⁵ Kwan et al.⁶ reported the overall complication rate and mortality rate for AIS surgery were 1.5% and 0.014%, respectively, with a five-fold decrement in overall complication rates from 2004–2007 to 2013–2016. Even though the complication risk had decreased in the past decade, studies reported that 42–47% of parents of children undergoing surgeries are under a significant level of stress and anxiety.^{7,8} Parental anxiety can directly affect children's anxiety level.⁹ Anxiety can have a negative impact on the child's recovery, leading to increased postoperative pain, analgesic usage, sleep disorders and delayed recovery milestones.^{9,10}

Due to the genetic predisposition^{2,3}, it is not uncommon to have twins diagnosed with AIS. Parents commonly have difficulties deciding between same-day sequential scoliosis surgeries and separate-day scoliosis surgeries for the twins. During preoperative counselling, surgeons should discuss the advantages and disadvantages of both approaches, which will help in the shared decision-making.

In this case report, the average operation duration was 106 minutes, and the average estimated blood loss was 581 ml. Both parents would still opt for same-day sequential scoliosis surgeries instead of separate-day scoliosis surgeries if they faced the same scenario again. They preferred to go through the stress and anxiety in one single day. Even though their surgeries funding was insurance-funded, they believed that same-day surgeries saved time, energy, and cost as the preoperative preparations, hospital admissions, discharges, postoperative care and follow-ups were done together. Both parents felt that their children were less afraid due to the

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Table I: Intraoperative parameters and detailed description of the interview

Intraoperative parameters and detailed description of the interview	First pair of twins		Second pair of twins		Average or Comments
	Twin 1	Twin 2	Twin 1	Twin 2	
Operative Duration (minutes)	107	85	97	136	106
Estimated blood loss (ml)	600	550	511	664	581
Mean blood salvage (ml)	376	120	228	283	251
Would you choose same-day sequential scoliosis surgeries or separate-day scoliosis surgeries if facing same scenario again?	Same-day sequential scoliosis surgeries		Same-day sequential scoliosis surgeries		Same-day sequential scoliosis surgeries
Parental VAS-Anxiety score during the twins' surgeries	5		1		3
Do you think same-day sequential surgeries have higher, same or lower levels of stress and anxiety, compared to separate-day surgeries?	Same		Lower		Lower or same
Do you prefer to go through the stress and anxiety on one day in same-day sequential scoliosis surgeries or twice as during separate-day scoliosis surgeries?	One day		One day		One day
Travel time from hometown (hours)	3.75		2		2.88
Transportation cost (USD)	43		216		130
Accommodation cost (USD)	0		32		16
Do you think same-day sequential surgeries save time, energy, and costs compared to separate-day surgeries?	Yes		Yes		Yes
In your opinion, are the twins more, same or less afraid of the surgeries in same-day sequential surgeries, compared to separate-day surgeries?	Less		Less		Less
In your opinion, do the twins have better, same or worse motivation, emotional support and companionship in same-day sequential scoliosis surgeries, compared to separate-day surgeries?	Better		Better		Better

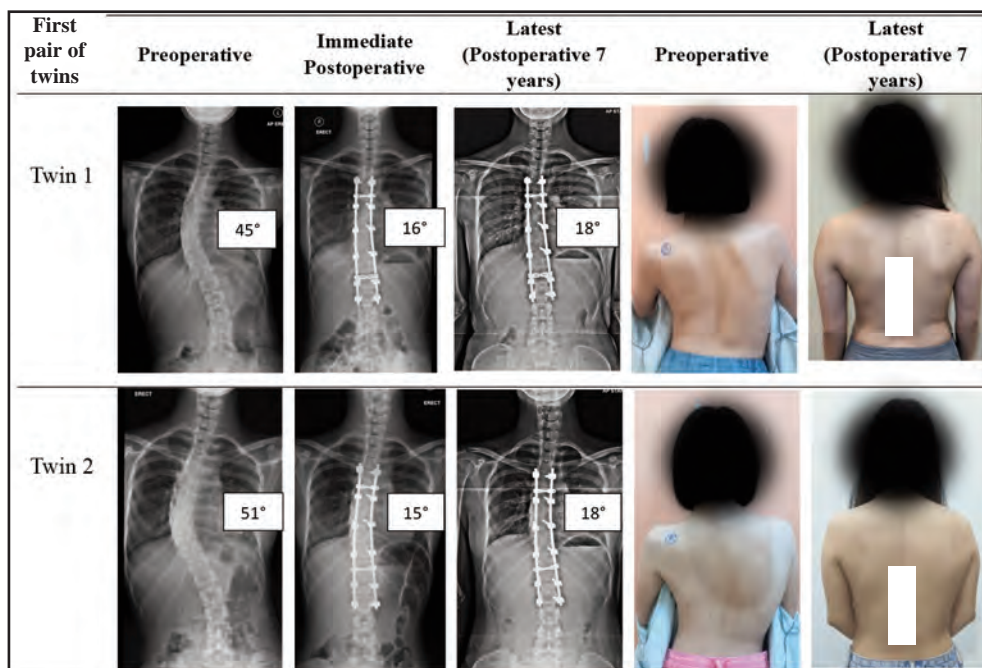


Fig. 1: Preoperative radiographs, immediate postoperative radiographs, latest follow-up radiographs, preoperative clinical photographs and latest postoperative clinical photographs of the first pair of twins.

Written consents were taken from the patients for the publication of their radiographs and clinical photographs.

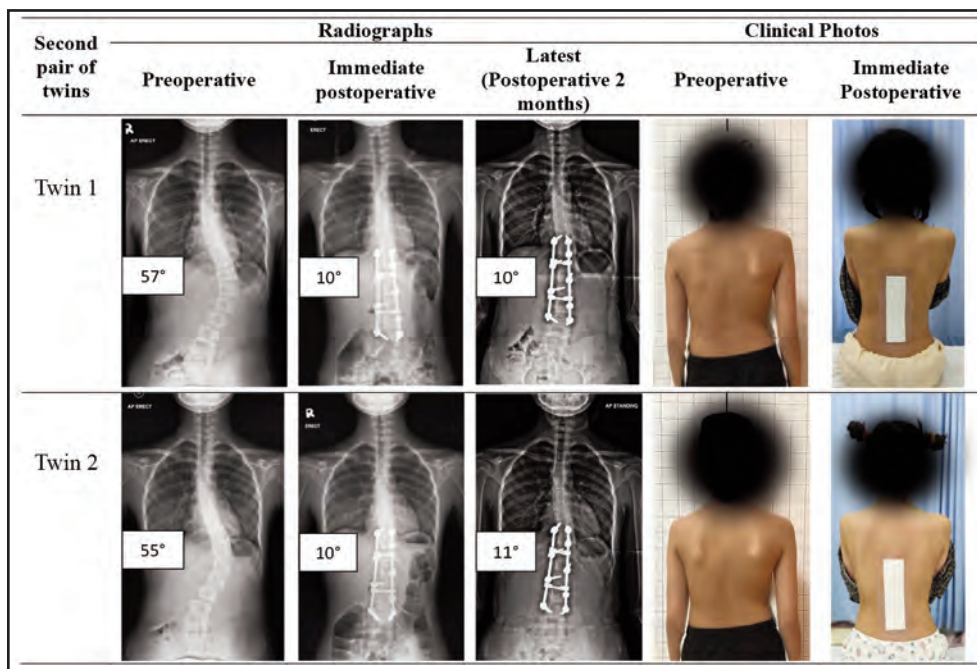


Fig. 2: Preoperative radiographs, immediate postoperative radiographs, latest follow-up radiographs, preoperative clinical photographs and immediate postoperative clinical photographs of the second pair of twins.

emotional support and companionship of the other twin. However, we acknowledged that some parents may have the opinion that the risks of occurrence of events or complications may change with performing surgeries on the same day or on different days.

All the surgeries were performed by the same team which comprises of two spine surgeons who operated together via dual attending surgeon strategy. While surgeons' fatigue is always being debated, this dual surgeon approach inevitably promotes tacit understanding between both surgeons during the surgery. It is also proven that dual attending surgeon strategy improves perioperative outcomes while decreasing complications in scoliosis surgeries.^{11,12}

However, we did not have twins who had chosen separate-day surgeries. Therefore, we could not share the advantages and disadvantages of this approach. In addition, the curves in both pairs of twins were not severe (single curve and less than 60°). This might also explain why performing sequential day surgery was feasible for both cases.

CONCLUSION

We found that sequential same-day scoliosis surgeries in twins were feasible and safe. Parents of twins perceived that this approach could be advantageous from the psychosocial and financial perspectives. This report could be a reference for twin patients that could aid their decision-making.

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