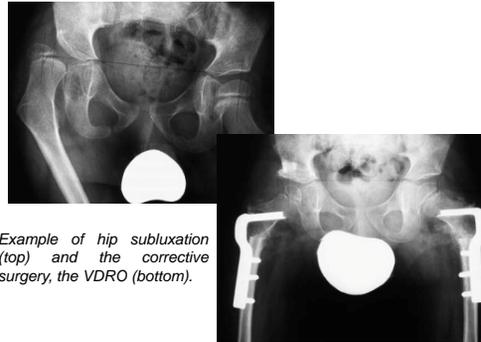


Abstract

Children with Cerebral Palsy (CP) often need corrective hip surgery. Surgery often results in high blood loss. By identifying those patients at risk for greater blood loss, we can help strategize blood product allocation and reduce the transfusion burden on those patients that may not be at higher risk. In this retrospective chart review, 87 patients were identified. We found that patients who received autologous blood (ex. CellSaver™) were also more likely to need an allogeneic (ex. packed RBCs) transfusion. The need for pelvic osteotomy, in addition to femoral osteotomy, carried a 2.25 times higher risk of needing an allogeneic transfusion ($p < 0.001$, 95%CI 1.402-3.611). Bilateral VDRO was 1.64 times more likely to need any form of transfusion compared to unilateral procedure, however this was not quite statistically significant ($p = 0.052$, 95% CI 0.972-2.756). This study was useful in identifying which patients are at higher risk for blood loss during reconstructive hip surgery.



Example of hip subluxation (top) and the corrective surgery, the VDRO (bottom).

Methods

A consecutive series of patients with CP who received VDRO surgery at a single institution from 2000 to 2012. We used a sub-group analysis for patients who did and did not receive a pelvic osteotomy in addition to the VDRO.

We collected demographic data as well as type of procedure performed, bilateral vs unilateral reconstruction, diagnosis, hemoglobin and hematocrit, estimated blood loss (EBL), total operative time, cell saver volume, units transfused, and complications. Data was compared using the Chi-squared method, or non-parametric alternative.

Results

87 patients were included in the study (134 hips). Descriptive data can be seen in Table 1. 38 out of 87 patients required an autologous blood transfusion (43.7%). There was no significant relationship between the use of autologous blood and age, gender, weight, height, or BMI. Patients who received autologous blood also had a higher EBL ($p = 0.029$) and were more likely to be transfused ($p = 0.023$). Concomitant DEGA procedure carried a 2.25 times risk of needing any form of blood transfusion ($p < 0.001$, 95%CI 1.402-3.611). Bilateral VDRO was 1.64 times more likely to need transfusion than a unilateral procedure, however this was not quite statistically significant ($p = 0.052$, 95% CI 0.972-2.756).

	Average	Std. Deviation
Age (years)	9.06	3.37
LOS (days)	3.75	2.5
Weight (kg)	26.18	13.48
Height (cm)	123.69	19.53
BMI	16.73	3.89
Surgical Time (mins)	151.6	47.02
Units Blood Transfused	0.49	0.64
Autologous Blood Given (mL)	87.14	196.39
EBL (mL)	239.71	202.44
ICU Days	0.79	1.79

Table 1: Descriptive data. The average patient was 9 years old, stayed in the hospital for 3.75 days, and lost an average of 240mL of blood during their procedure. EBL = estimated blood loss, BMI = body mass index.

	Total	Percent
Male	41	47.1
Female	46	52.9
Bilateral Hip Surgery	47	54
Unilateral Hip Surgery	40	46
Concurrent Pelvic Surgery	39	44.8
Patients Transfused	38	43.7
Pts. receiving Autologous Blood Products	28	32.2

Table 2: More descriptive data. Gender distribution and the percentage of bilateral and unilateral procedures were near equal. 44.8% of patients had a concurrent pelvic osteotomy, 43.7% of patients needed a blood transfusion after their procedure, and 32.2% were given autologous blood

	2-tailed Sig.
Age (years)	0.767
LOS (days)	0.528
Weight (kg)	0.882
Height (cm)	0.334
BMI	0.226
Surgical Time (mins)	0.326
Units Blood Transfused	0.066
EBL(mL)	0.29
ICU Days	0.239

Table 3: Correlation with autologous blood product. This table is a comparison of the patient demographic data versus those that received the administration of their own, autologous blood. This was a t-test for equality of means. Note that the only statistically significant finding was that patients who received autologous blood product were more likely to also need a blood transfusion ($p = 0.029$). Significance was defined as $p < 0.05$. LOS = length of stay, BMI = Body mass index.

Introduction

The hip joint tends to be highly affected in patients with Cerebral Palsy (CP). Subluxation, problems with ambulation, posture, perineal hygiene, and pain can result. Severe cases often require corrective surgery of the affected dysplastic hip(s). This often is accomplished with varus derotational osteotomy (VDRO), femoral osteotomy, pelvic osteotomy, tendon releases/lengthening, or a combination of any of these procedures. These reconstructive hip surgeries can result in marked blood loss. In this study, we tried to identify risk factors that are associated with greater blood loss during VDRO surgeries. This information could enable targeted use of available blood salvage techniques and be useful for counseling patients and their families before surgery as well as decrease overall healthcare costs.

Discussion and Conclusions

Varus derotational osteotomy for the correction of neuromuscular hip dysplasia can be associated with excessive blood loss, especially in the CP patient population. The use of autologous versus allogeneic blood products carries various risks and benefits. This project highlighted the demographic that typically undergoes this surgery. Factors such as height, weight, gender, age, and BMI did not present significant risk factors that could be used for prognostic purposes. Furthermore, it was identified that the need of concomitant pelvic osteotomy is correlated with increased blood loss. Also, the use of autologous blood product is correlated with increased blood loss. Lastly, patients who had autologous blood transfusion did have a significantly higher average EBL ($p = 0.029$).

This information can be used by future clinicians to help identify patients preoperatively who might be subject to increased blood loss. This study also showed that the use of autologous blood did not reduce the need for transfusion. Further research is needed to help further determine the overall utility of autologous blood product in this patient population.

Acknowledgements

I wish to thank my mentor Dr. M. Wade Shrader and his research coordinator, Carla Boan, for their help with the project.