J Child Orthop (2007) 1:221–227
DOI 10.1007/s11832-007-0032-6

ORIGINAL CLINICAL ARTICLE

Cell Saver: is it beneficial in scoliosis surgery?

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Received: 21 November 2006 / Accepted: 20 May 2007 / Published online: 10 July 2007

Abstract
Study design Review of the use of Cell Saver in a non-randomized group of patients undergoing spinal fusion for scoliosis.
Objectives To determine the efficacy of the use of Cell Saver for spinal fusions for scoliosis.
Summary of background data Although Cell Saver is widely used in scoliosis surgery, it is not clear whether its use decreases the need for other transfusions or whether there are certain patients more likely to benefit from its use. The blood collected by Cell Saver intraoperatively is not always of sufficient volume to be returned to the patient, and there are no current guidelines addressing the amount that is likely to be returned to the patient.
Purpose The purpose of this study was to determine: Does use of Cell Saver reduce the need for other transfusions in scoliosis surgery? Is there an amount of blood loss at which Cell Saver is likely to be returned?
Materials and methods The study group consisted of 95 children who had undergone posterior spinal fusion between January 2002 and March 2004 with one of two surgeons. One surgeon used Cell Saver, the other surgeon did not. Of the total, 58 patients who underwent posterior spinal fusion with the use of Cell Saver (group 1) were compared with the 37 (group 2) who underwent the same procedure without the use of Cell Saver.
Results Of those in group 1, 34 received Cell Saver blood back as an intraoperative autologous transfusion (IAT) (59%). Patients in the Cell Saver group were just as likely to receive non-Cell Saver transfusions as those in the control group ($P = 0.12$). Of the 39 patients who lost more than 500 cc of blood, 34 received IAT (87%). No patient who lost less than 500 cc of blood received IAT.
Conclusion The use of Cell Saver does not reduce the need for other transfusions in scoliosis surgery. The amount of blood loss at which Cell Saver is likely to be returned is 500 cc. We demonstrated no benefit in the use of Cell Saver in our patient population.

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Introduction

Cell Saver is commonly used in spinal fusion for scoliosis as a means of salvaging and returning the patient's red blood cells. However, it is not clear whether use of Cell Saver decreases the need for other transfusions in this patient population. While some studies have found that Cell Saver use decreases the need for other blood transfusion in orthopedic surgery [1–4], others have found its use to be of little or no benefit [5, 6].

The device itself, setup, and personnel associated with Cell Saver use add significant cost to the surgery. Others have estimated the cost of Cell Saver for spinal fusion to be $240 [6] to $512 [5] per operative case. These authors concluded that Cell Saver was more expensive than predonated blood for autotransfusion [5, 6].

It is unclear whether there are certain patients who would most likely benefit from the use of Cell Saver.

Previous studies examining the usefulness of Cell Saver in orthopedic surgery have included mostly adult patients [1–5], with the exception of Siller et al. [6], who studied adolescents undergoing spinal fusion for idiopathic scoliosis. To our knowledge, there has been no published study examining scoliosis patients of all ages and etiologies to determine the usefulness of Cell Saver in this setting.

Furthermore, red blood cells collected by the Cell Saver system are not always of sufficient volume to be returned to the patient. At our institution, 250 cc of blood must be collected to facilitate the wash necessary for return. It is unclear how much blood is actually lost for 250 cc to be collected, washed, and returned to the patient.

The purpose of this study was to determine whether (1) Cell Saver reduces the need for other (non-Cell Saver) transfusions in posterior spinal fusion for scoliosis, (2) there are certain patients in whom Cell Saver blood is more likely to be given back intraoperatively, and (3) there is an amount of blood loss at which Cell Saver is likely to be returned.

Materials and methods

Two surgeons performed a total of 95 consecutive cases of posterior spinal fusion for scoliosis during a 2-year period from January 2002 to March 2004. Both surgeons operated in the same hospital under similar conditions. These surgeons worked closely together and employed similar techniques in exposure, hardware placement, and closure. They consulted with one another in pre-, intra-, and postoperative planning and decision making. Patients were excluded from the study if they underwent an anterior procedure or were opposed to blood transfusion due to religious beliefs (Jehovah's witnesses). The patients were not randomized, and use of the Cell Saver was determined by the surgeons' preference. One surgeon used Cell Saver in every spinal fusion for scoliosis, the other did not. Blood loss was estimated by evaluating the amount of blood in the suction canister and that in the soaked lap pads. Patients with idiopathic scoliosis received a blood transfusion if they showed clinical signs or symptoms of hypotension and had a hematocrit of less than 20. Patients with neuromuscular scoliosis received a blood transfusion if they showed clinical signs or symptoms of hypotension or had a hematocrit of less than 25. Two drains were routinely placed postoperatively, one superficial and one deep. Drains were discontinued no sooner than postoperative day 3, with output of less than 100 cc over 24 h. The Cell Saver group included 58 patients. The control group, in which Cell Saver was not used, included 37 patients.

Patients' charts were reviewed retrospectively for age, gender, diagnosis, weight, number of levels fused, intraoperative blood loss, postoperative blood loss, blood returned from the Cell Saver, and other blood transfusions. The term "other blood transfusions" is used to describe all transfusions that were not Cell Saver return.

The data were analyzed to determine which factors were associated with higher rates of Cell Saver return.

Results

The average patient age was 14 years plus 1 month, with patients of similar ages in each group. There were 25 male patients and 70 female patients, with similar distributions in each group. The patients' average weight was 50.3 kg, with no significant difference between the groups ($P = 0.365$). Demographics are further detailed in Table 2.

The mean pre-operative Cobb angle was 63.9° in group 1 and 63.1° in group 2 (Table 1). The average number of levels fused was 11.8 levels. The average in the Cell Saver group was 11.2 levels, and the average in the control group was 12.7 levels ($P = 0.058$) (Table 1).

Intraoperative blood loss averaged 733 cc. There was no statistical significance in blood loss between group 1 (EBL 763 cc) and group 2 (EBL 688 cc) (Table 1). There was no correlation between number of levels fused and the likelihood of receiving IAT ($P = 0.18$) or between number of levels fused and likelihood of receiving other transfusions.

Patients in the Cell Saver group were just as likely to receive non-Cell Saver transfusions as those in the control group ($P = 0.12$). Of the 39 patients who lost more than 500 cc of blood, 34 received IAT (87%). No patient who lost less than 500 cc received IAT.

The diagnoses were as follows: 71 patients had idiopathic scoliosis and 24 patients had neuromuscular scoliosis. Specific neuromuscular diagnoses included 15 patients with cerebral palsy, 6 patients with muscular dystrophy, 2 patients with Rett's syndrome, and 1 patient with neurofibromatosis (Table 2). Patient distribution between groups 1 and 2 was even. There was no correlation between

Table 1 Age, estimated blood loss, weight, and number of levels fused

		Cell Saver	Control
Age (years)	Average	13 + 6	14 + 1
	Range	10–20	8–18
Estimated blood loss (cc)	Average	781	656
	Range	120–4,200	75–3,600
Weight (kg)	Average	49	52
	Range	26–83	25–94
Number of levels fused	Average	11	13
	Range	5–17	7–17

Table 2 Demographics: summary of patient data (missing data denoted by empty boxes)

Cell Saver or control group	Diagnosis	Sex	Age (year/month)	Weight (kg)	Pre-operative Cobb angle	Number of levels fused	EBL (cc)	Non-Cell Saver transfusions (cc)	Pre-operative H/H	Post-operative H/H	Post-operative day 1 H/H	Lowest post-operative H/H	Discharge H/H
Control	Cerebral palsy	Male	10/4	32.7	70	17		510	14.1/41.5	9.9/30	8/24	7.1/21.6	13/38.8
Control	Cerebral palsy	Female	13/2	28.1	72	17	450	230	12.4/37.2	12.2/36	11.3/33.3	9.4/28.8	9.4/28.8
Control	Cerebral palsy	Male	13/9	88.6	76	16	750	295	13.6/40	12.7/36.6	9.3/27.9	8.1/23.9	11.1/32.9
Control	Cerebral palsy	Male	14/4	35.5	93	16	3,600	1625	13.2/40.1	12.5/38		9.7/28.5	11.4/35.2
Control	Cerebral palsy	Male	15/9	33.0	60	16	225	0	14.1/41.6	10.6/31.1	10.3/30.4	10.3/30.4	10.7/33.1
Control	Cerebral palsy	Male	16/10	48.1	66	16	1,000	1085	11.3/33.4	9.8/29.1	9.7/28.1	8.6/25.7	10.2/31.9
Control	Cerebral palsy	Female	18/7	34.7	65	17	900	1310	13.4/39.9	8.5/24.3	7.3/20.4	6.9/21	11.9/35.1
Control	Duchenne's muscular dystrophy	Male	14/3	37.0	90	17	400	0	12/38.9	8/32	11/31.9	10.8/31.3	12.4/36.2
Control	Idiopathic	Female	09/6	52.1	63	10	500	285	13.1/39.5	9.6/29.5	8.9/26.6	7.8/23.1	9.5/28.8
Control	Idiopathic	Female	11/2	52.3	51	10	600	565	13.4/39.1	8.7/25.9	8.8/26	8.7/25.9	11.4/34.4
Control	Idiopathic	Male	11/8	83.3	57	12	700	0	12.3/37.9	10.3/31.2		8.9/27.4	
Control	Idiopathic	Female	12/4	40.2	76	14	665	0	12.7/36.8	8.6/25.8	7.2/21.8	6.5/18.9	6.7/20.5
Control	Idiopathic	Female	12/4	47.3	65	12	400	605	14.1/44.3	10.9/34.2	6.6/20.8	6.6/20.8	9.8/28.6
Control	Idiopathic	Female	13/5	44.8	54	13	2,500	1165	13.9/40.9	12.1/35.2		7.9/23.1	
Control	Idiopathic	Female	13/8	35.4	50	8	100	560	13.1/39	10.2/31.3	8.8/26.7	7/21.9	12.2/38.2
Control	Idiopathic	Female	13/8	77.4	59	12	700	0	13.1/39.5	10.7/33.1	8.1/24.9	8.1/24.9	10.5/32.3
Control	Idiopathic	Female	13/11	73.5	70	12	350	0	13.2/38.4	11.1/33.4	9.5/28.5	9/27	9/27
Control	Idiopathic	Female	13/12	34.6	65	13	270	0	14.2/42.6	10.2/30.6	8.9/27.1	7.9/23.8	7.9/24.2
Control	Idiopathic	Male	14/3	48.2	72	10	250	0	13.7/38.9	11.3/32.1	10.2/29.5	10.2/29.5	10.2/29.5
Control	Idiopathic	Female	14/4	52.0	56	9	75	0	12.5/36.9	11.1/32.7	8.8/26.5	8.3/24.6	8.9/26.5
Control	Idiopathic	Female	14/5	52.5	55	14	650	535	13.3/39.3	7.9/23.1	9/26.1	6.1/18	9/27.4
Control	Idiopathic	Male	14/10	39.0	68	11	400	0	15.2/44.2	9.1/27	9.1/26.8	8.8/26.2	8.8/26.4
Control	Idiopathic	Male	15/1	94.8	79	14	500	0	13.2/39.5	9.7/29.4	8.4/24.9	8.4/24.9	8.5/26
Control	Idiopathic	Female	15/2	66.1	56	11	750	240	13.7/40.2	9.5/28.3	6.9/20.6	6.9/20.6	11.4/32.8
Control	Idiopathic	Female	15/3	39.7	52	10	500	0	13.9/41.2	9.2/27.1	9.9/27.9	9.9/27.9	9.8/28.7
Control	Idiopathic	Female	15/4	68.6	50	7	100	0	12.7/36.9	10.6/23.8	8.1/24	8.1/23.8	8.9/26.2
Control	Idiopathic	Male	15/5	60.0	54	10	150	0	15.4/47.1	12.9/38.7	10.9/32.4	10.9/32.4	10.9/32.4
Control	Idiopathic	Female	15/7	54.0	59	13	900	495	14.1/41.5	9.8/29.8	7.4/22.1	6.2/18.6	9.4/27.5
Control	Idiopathic	Female	15/11	59.6	56	16	600	0	13.6/39.6	9.8/29.1	9.3/27.8	8.1/24.9	10.6/31.1
Control	Idiopathic	Female	16/9	53.1	54	11	400	220	12.2/36.8	8.7/26.4	6.6/20.1	6.6/20.1	8.3/25.1
Control	Idiopathic	Female	16/10	58.8	50	8	250	0	14.5/41.5	/31.3	10.4/31.3	10.4/31.3	11.3/32.9
Control	Idiopathic	Male	16/11	56.1	77	11	500	0	13.5/40.8	11/34.5	8.7/27.2	7.7/23.9	7.7/23.9
Control	Idiopathic	Female	18/2	50.8	79	11	1,100	1070	14/42.2	9.6/29.8	8/25.3	8/25.3	12.4/37.7

Table 2 continued

Cell Saver or control group	Diagnosis	Sex	Age (year/ month)	Weight (kg)	Pre-operative Cobb angle	Number of levels fused	EBL (cc)	Non-Cell Saver transfusions (cc)	Pre-operative H/H	Post-operative H/H	Post-operative day 1 H/H	Lowest post-operative H/H	Discharge H/H
Control	Idiopathic	Female	18/5	62.5	54	14	630	545	11.6/35.4	8.7/26.9	8.3/25.4	7.9/23.8	9.9/30.2
Control	Idiopathic	Female	18/9	61.5	51	13	725	295	13.3/38.4	10.4/29.8		7/20.7	
Control	Idiopathic	Female	18/10	44.0	51	12	400	510	13.2/39	10.4/30.6	7.4/22.2	7.4/22.2	9.3/27.6
Control	Muscular dystrophy	Female	08/12	25.1	60	17	625	1125	15.1/44.2	10.8/31.5	8.4/23.5	8.4/23.5	12.4/37.4
Cell Saver	Cerebral palsy	Female	11/10	26.6	75	12	120	345	14.1/42.2	7.5/22.4	12/35.2	7.5/22.4	9.9/28.7
Cell Saver	Cerebral palsy	Male	13/1	39.3	80	17	1,302	985	13.8/42.2	10.9/33.5	9.2/28.7	9.2/21.9	10.1/30.1
Cell Saver	Cerebral palsy	Female	13/9	27.5	90	16	300	220	14.1/44.5	10.1/31	7.4/22.5	7.4/22.5	11.7/34.5
Cell Saver	Cerebral palsy	Female	14/1	48.0	70	14	350	715	13.5/41.3	10.5/31.7	8.7/27.4	7/22	11/33.5
Cell Saver	Cerebral palsy	Female	14/7	27.7	65	13	900	495	13.8/40	10.5/29		7.1/21	
Cell Saver	Cerebral palsy	Male	14/9	34.4	80	14	800	465	13.9/42.6	10.5/32.4	7.7/24.1	7.5/23.3	11.8/35.9
Cell Saver	Cerebral palsy	Male	14/10	43.0	80	17	400	505	15/46.7	10/31.3	7.8/24.1	7.8/24.1	9.8/30.6
Cell Saver	Cerebral palsy	Male	16/10	32.3	90	14	600	0	15.6/47.4	11.3/34.5	9.9/30.4	9.7/29.9	10.1/31.3
Cell Saver	Duchenne's muscular dystrophy	Male	12/9	56.8	40	16	600	840	11.3/34	11.3/33.9	8.8/27	7.2/22.4	11/33.7
Cell Saver	Duchenne's muscular dystrophy	Male	13/6	72.7	50	16	4,200	1835	15/44	8.8/26.2		7.8/22.9	
Cell Saver	Duchenne's muscular dystrophy	Male	18/8	67.2	85	15	3,500	840	/44	9.3/28.1		8.2/25.2	
Cell Saver	Idiopathic	Female	10/7	38.6	62	13	700	255	12.6/38	11.6/34.5	10.2/30.9	8.7/27.3	8.7/27.3
Cell Saver	Idiopathic	Female	10/10	53.7	50	8	350	0		9.1/30		8.3/27.6	
Cell Saver	Idiopathic	Female	10/11	37.3	58	13	1,100	825	13.4/39.5	10.5/30.9	9/26.6	7/21.7	12.5/36.7
Cell Saver	Idiopathic	Female	11/2	43.6	56	12	500	0	13.8/39.5	10.6/31.1	8.7/26	8.7/25.5	8.7/25.6
Cell Saver	Idiopathic	Female	11/6	50.3	155	13	300	0	14.4/42	11.4/33.1	9.7/29.1	8.8/25.9	9.4/26.9
Cell Saver	Idiopathic	Female	11/9	28.7	72	10	300	275	13.4/38.6	12.3/35.4	11.9/34.1	9.8/29	9.8/29
Cell Saver	Idiopathic	Female	11/9	32.0	55	13	1,150	235	12.4/37.6	9.4/28.4	8.2/25.1	7.2/21.9	12.2/38.7
Cell Saver	Idiopathic	Female	12/5	55.0	55	13	650	220	14.3/14.3	10.7/30.7	8.9/26	8.7/25	9/26.1
Cell Saver	Idiopathic	Female	12/6	49.0	50	6	300	0	14.5/41.8	10.7/31.5		8.5/26	
Cell Saver	Idiopathic	Female	12/6	49.3	57	11	816	585	13.5/39.7	10.5/31	9.8/29.4	8.9/27.4	9.8/29.7
Cell Saver	Idiopathic	Female	12/6	71.4	60	9	600	0	12.1/35.9	10.1/30.3	8.4/25.6	8.1/24.5	9.5/28.7
Cell Saver	Idiopathic	Female	12/7	40.9	80	13	600	450	13.1/38.6	11.6/35.9	11/33.7	9.5/28.9	11.4/32.3
Cell Saver	Idiopathic	Female	12/7	38.9	61	12	700	265	12.2/37	9.6/28.3	9/28.4	7.1/7.1	11.2/34.2
Cell Saver	Idiopathic	Female	12/8	71.3	55	11	850	530	13.5/38.3	12.6/36.1	11.3/33.2	11.3/32.9	10.4/31

Table 2 continued

Cell Saver or control group	Diagnosis	Sex	Age (year/ month)	Weight (kg)	Pre-operative Cobb angle	Number of levels fused	EBL (cc)	Non-Cell Saver transfusions (cc)	Pre-operative H/H	Post-operative H/H	Post-operative day 1 H/H	Lowest post-operative H/H	Discharge H/H
Cell Saver	Idiopathic	Female	12/8	47.7	70	10	400	0	15.6/44.2	10.6/29.8	8.6/25.2	8.1/23.9	8.1/23.9
Cell Saver	Idiopathic	Female	12/10	53.4	55	11	400	0	13.4/38.9	11.2/32.9	10.9/31.4	9.3/28.4	9.8/29.1
Cell Saver	Idiopathic	Female	12/12	56.6	45	7	600	520	14/40.5	11.5/33.1	9.2/26.9	8/24.4	7.7/22.9
Cell Saver	Idiopathic	Female	13/3	54.3	49	10	400	240	14.4/39.6	10.5/29.6	9.4/28	8.2/24.3	10.5/29.6
Cell Saver	Idiopathic	Female	13/6	45.2	55	12	2,000	940	13.3/39.2	7.7/23.7	7.7/23.3	7.7/23.3	8.6/25.5
Cell Saver	Idiopathic	Female	13/7	50.0	68	13	570	0	13.9/41.3			8.5/25.5	
Cell Saver	Idiopathic	Female	13/11	50.2	65	10	350	0	13.8/40.6	10.8/32.6	9.1/27.8	8.5/26.1	8.6/26.4
Cell Saver	Idiopathic	Female	14/2	70.8	59	12	800	0	12.1/34.6	10.2/29		6.9/21.2	12.5/37.4
Cell Saver	Idiopathic	Female	14/2	50.4	62	7	530	0	12.7/36.6	11/32.2	8.8/25.4	8.8/25.4	10/30.1
Cell Saver	Idiopathic	Female	14/2	58.5	51	7	400	0	11.5/34.9	9.7/9.7	8.7/27.4	8.9/27.4	9/28.5
Cell Saver	Idiopathic	Male	14/4	46.5	55	10	550	285	14.8/43.1	10.9/31.9	8.8/25.3	7.4/21.7	8.8/25.6
Cell Saver	Idiopathic	Female	14/4	57.1	68	13	1,600	460	14/41.7	11.3/33.3	11.3/34.2	10.6/31.8	10.2/30.6
Cell Saver	Idiopathic	Female	14/9	51.3	73	13	1,200	0	13.3/39.4	9.7/28	9/26.4	8.4/24.9	8.3/25.8
Cell Saver	Idiopathic	Male	14/10	48.2	60	6	650	0	13.9/40.2			7.4/22	
Cell Saver	Idiopathic	Female	14/10	37.3	56	13	964	570	14/42.1	9.8/29.8	6.3/18.6	6.3/18.6	11.4/33.3
Cell Saver	Idiopathic	Female	15/2	43.2	72	10	250	0	10.9/34.4	8.4/26.9	7.6/24.2	7.4/23.9	8.1/24.8
Cell Saver	Idiopathic	Female	15/2	56.9	72	9	600	0	12.3/36.5	8.6/25.8	9.4/27.9	7.6/22.4	9.4/28
Cell Saver	Idiopathic	Female	15/5	53.3	70	7	300	0	13.8/41.1	10.9/32.4	8.7/26.2	8.2/24.6	9.3/29.3
Cell Saver	Idiopathic	Female	15/5	83.2	70	13	850	0	11.9/34.9	9.9/29.3	8.7/25.1	8.6/25.1	8.9/26.1
Cell Saver	Idiopathic	Female	15/7	49.3	45	6	350	0	13.2/39.6	10.7/31.3	9.1/27.2	8.6/26	8.6/26
Cell Saver	Idiopathic	Male	15/11	54.6	53	12	800	0	15/45.5	34.9/34.9	9.4/28.6	25.6/25.6	8.4/26.1
Cell Saver	Idiopathic	Male	16/6	42.9	75	7	660	640	14/40.6	11.1/32.3	9.6/28	8.7/25.1	10/29.4
Cell Saver	Idiopathic	Female	17/7	62.1	40	6	200	240	10.8/33.8	8.6/27.5	8.9/28.4	7.6/23.2	7.6/23.7
Cell Saver	Idiopathic	Female	17/12	51.7	45	5	200	0	12.4/36.9	10.2/30.2	10.5/31.6	10.2/30.2	11.5/35.7
Cell Saver	Idiopathic	Female	18/4	57.6	46	6	500	0	12.2/35.4	10.1/29.3	8.4/24.9	7.7/22.8	11.7/33.5
Cell Saver	Idiopathic	Female	18/9	54.3	45	10	500	0	14.2/40.6	10.2/29.4	8.2/24.2	8.2/24.2	10.4/30.6
Cell Saver	Idiopathic	Male	19/1	65.1	56	6	800	0	16.3/47.8	12.9/38.2	11.3/34.4	9.3/27.4	9.9/29.6
Cell Saver	Idiopathic	Female	20/9	49.0	62	13	600	0	12.3/35.3	11/30.9	9.8/27.8	9.8/27.8	9.8/31.4
Cell Saver	Idiopathic	Female	14	58.0	50	9	800	0	12.8/36.6	11.4/32.7		8.9/26.6	
Cell Saver	Muscular dystrophy	Male	13/9	72.2	50	15	2,500	925	13.6/42.4	13.8/41.8		7.5/23.6	
Cell Saver	Neurofibromatosis	Female	11/2	26.7	80	11	200	555	15.1/43	11.6/32.9	9/25.8	6.6/20	13.7/39.8
Cell Saver	Rett's syndrome	Female	11/5	27.0	70	17	1,200	1475	12.8/36	15.4/43.5		10.2/29.8	
Cell Saver	Rett's syndrome	Female	16/6	34.9	82	15	600	265	14.4/42.8	9.9/29.8	9.8/29.1	8.6/25.6	10.1/31.3

diagnosis and non-Cell Saver transfusions. Children in group 1 with neuromuscular scoliosis were just as likely to receive non-Cell Saver transfusions as those in group 2 ($P = 0.26$). Children in group 1 with idiopathic scoliosis were just as likely to receive non-Cell Saver transfusions as those in group 2 ($P = 0.16$).

The mean pre-operative hemoglobin/hematocrit was 13.5/39.7 (group 1 mean 13.5/39.5, group 2 mean 13.4/39.8). The mean hemoglobin/hematocrit on postoperative day 1 was 9/27 (group 1 mean 9.2/27.7, group 2 mean 8.8/26.1). The mean hemoglobin/hematocrit upon discharge was 10/30 (group 1 mean 10/30, group 2 mean 10/30) Table 2.

Discussion

Cell Saver is widely used in scoliosis surgery. The benefit of the device has not been proven, however. It was our anecdotal experience that Cell Saver does not consistently decrease the patient's need for other transfusions. This study was thus undertaken to examine the use of Cell Saver in scoliosis surgery.

One weakness of this investigation was that the decision to transfuse the patient was dependent on the attending surgeons' preference. This was based on the clinical picture, and was thus not standardized.

Previous studies have shown that Cell Saver does decrease the need for transfusions of other kinds [7–10]. Goulet et al. [2] found that transfusion requirements were decreased when Cell Saver was used in orthopedic procedures. McMurray et al. [1] and Garvin et al. [11] found that Cell Saver decreased the need for donor blood transfusion in primary and revision hip arthroplasty. Cell Saver has also been shown to decrease the amount of other blood transfusions in children undergoing acetabuloplasty [12]. A meta-analysis of the literature on the topic of anesthesia examining the effectiveness of Cell Saver found that its use in orthopedic surgery decreased the need for other transfusions [3]. Reitman et al. [5] studied Cell Saver use in adult lumbar fusion surgery. They found that 36% of patients who had Cell Saver required 1 unit of blood transfusion, compared with 50% of patients who did not have Cell Saver. However, the authors were careful to qualify that autologous blood predonation affected their study, and that "the use of Cell Saver in patients who did not predonate (blood) was not significantly beneficial toward reducing the need for transfusion". Anand et al. [13] showed that the use of Cell Saver decreased the need for homologous blood transfusion.

We conclude that Cell Saver does not decrease the incidence of other blood transfusions in scoliosis surgery. Other studies that draw similar conclusions include the following: Siller et al. [6] examined Cell Saver use in spinal fusion for idiopathic scoliosis and found that "blood requirements for this procedure can be met less expensively and more reliably by merely donating one's own blood". Similar findings are reported regarding other orthopedic procedures and Cell Saver. Lisander et al. [4] concluded that Cell Saver is not sufficient to decrease the need for other blood transfusions in hip arthroplasty. Abildgaard et al. [14] came to a similar conclusion regarding the use of Cell Saver in major back surgery.

The Cell Saver device is often set up for surgery without return of the collected fluid to the patient. This study found that blood loss of 500 cc correlated with return of blood to the patient using this system. The surgeon can use this number to better estimate the likelihood of Cell Saver return when deciding whether or not to use the device. If less than 500 cc of blood loss is expected, this study shows that the cost of Cell Saver setup and personnel is not justified.

During this study, we found no correlation with benefit based on number of levels fused, diagnosis, or patient weight. These criteria are therefore not helpful in aiding the surgeon in planning for Cell Saver setup.

Conclusion

The use of Cell Saver does not reduce the need for other transfusions in scoliosis surgery. The amount of blood loss at which Cell Saver is likely to be returned is 500 cc. We demonstrated no benefit in the use of Cell Saver in our patient population.

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