

Gomco Versus Mogen? No Effect on Circumcision Revision Rates

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ABSTRACT

OBJECTIVES: Elective newborn circumcision, one of the most common surgical procedures in the world, is often performed with either the Gomco clamp or the Mogen clamp. Our aims were to determine differential circumcision revision and complication rates due to surgical technique and differences in outcomes when residents versus attending physicians performed the procedure.

METHODS: We conducted a retrospective chart review of newborns who underwent elective circumcision at our children's hospital from January 2013 to June 2017 using *Current Procedural Terminology* codes for newborn circumcision and repair of an incomplete circumcision. We excluded patients who were initially circumcised by a physician other than a pediatrician and procedures that were performed after 31 days of age. The primary outcome was the rate of circumcision revisions. The secondary outcome was the incidence of minor and major complications. We used independent sample *t* tests, analysis of variance, Fisher's exact test, and logistic regression models in the analysis.

RESULTS: We analyzed 979 Gomco and 718 Mogen procedures. Both groups had similar complication (26 of 1697 or 1.53%) and revision rates (8 of 1697 or 0.47%). Attending physicians and residents had similar revision rates overall, but residents using the Gomco clamp had a higher rate of revision (2 of 249 or 0.80%) than attending physicians (2 of 730 or 0.27%; $P = .003$). Older age at primary procedure was significantly associated with revision ($P = .03$).

CONCLUSIONS: Elective newborn circumcision is associated with similar complication and revision rates after the use of either Gomco or Mogen clamps. There were no differences in outcomes when the procedure was performed by pediatric residents or attending pediatricians.

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Elective newborn circumcision is one of the most commonly performed surgical procedures in the world.¹ Most circumcisions are performed with either the Gomco clamp or the Mogen clamp. The Gomco approach is associated with more pain and a longer operating time compared with the Mogen approach.² There is scant additional information on the differences in procedural complications, outcomes, and revision rates after the use of either method. The Gomco clamp consists of a metal bell that fits over the glans and under the foreskin and a circumferential metal clamp that fits over the bell. One of 3 sizes of Gomco clamp is chosen on the basis of neonatal penile size. The Mogen clamp is a flat metal device with a narrow opening that the foreskin is pulled through; there is a concavity to protect the glans.

Complications occur in <0.5% of circumcisions, with postoperative bleeding accounting for most complications.² Rarer complications include infection, meatal stenosis, and sepsis.^{3–5} Rare severe complications have been reported as case reports (eg, penile degloving with the Gomco clamp⁶ and partial amputation with the Mogen clamp⁷).

Some families seek revision after newborn circumcision,⁸ typically because of unsatisfactory cosmesis (reported rates vary widely^{4,9}). Parents who seek circumcision revision are more likely to be white and have public insurance.¹⁰ It is unknown if complications or revisions are related to surgical approach (Gomco versus Mogen) or to the experience level of the primary proceduralist.^{1,9,10} Surgical approach is typically selected on the basis of physician preference, and no current evidence suggests that this preference would be expected to alter the incidence of revision or complications.

Our primary purpose for this study was to determine if there are differences in circumcision revision rates depending on surgical technique. Because no authors of previous literature have investigated if there are differential outcomes of circumcisions performed by trainees, our secondary aim was to analyze differences in complications and revision rates for circumcisions

performed by residents versus attending physicians.

METHODS

We conducted a retrospective chart review of newborns who underwent elective circumcision at our children's hospital from January 2013 to June 2017. All circumcisions were performed by hospital-based pediatricians or the pediatric residents under their supervision. Patients were identified by using *Current Procedural Terminology* codes 54150 and 54163 for newborn circumcision and repair of incomplete circumcision, respectively. Our hospital delivered 2638 male patients during the study period, and 1603 patients underwent circumcision. An additional 229 patients born at other hospitals had referred circumcisions at our institution during the study period and were included for a total of 1697 initial procedures. Patients who were circumcised by a physician other than a pediatrician, and procedures performed after 31 days of age were excluded ($n = 72$). We collected data on race, insurance status, gestational age, birth weight, age at circumcision, clamp type, and physician type (resident or attending). The primary outcome was the rate of circumcision revisions before June 2017. Secondary outcomes included minor complications (such as prolonged bleeding) and major complications (such as lacerations, hematomas, or dehiscence). We analyzed the data using independent sample t tests, analysis of variance, and Fisher's

exact test. The adjusted odds ratio (aOR) for revision was determined by logistic regression, controlling for known factors related to the pursuit of revisions, such as white race, public insurance status, lower birth weight, and younger gestational age. All analyses were performed by using RStudio (RStudio, Inc, Boston, MA); a P value <.05 was considered significant.

RESULTS

There were 979 and 718 circumcisions performed with Gomco and Mogen clamps, respectively. Of subjects, 63 (3.71%) had a mild congenital genitourinary anomaly that did not preclude circumcision, such as mild penile torsion, penoscrotal fusion, or foreshortened foreskin. The proportion of patients with these anomalies was similar between groups (Table 1). The Gomco group had a slightly higher mean gestational age and birth weight than the Mogen group (Table 1). The median age at circumcision was similar in both groups, with the procedure typically being performed on day 2 of life.

The overall complication rate after circumcision was 26 of 1697 (1.53%), and the rates were similar between the Gomco and Mogen groups ($P = .54$) as well as between attending physicians and residents ($P = .34$). Incidence of minor bleeding was similar between clamp types ($P = .31$) and physician level of training ($P = .15$; Table 2). Attending physicians and residents using the Gomco clamp had similar complication

TABLE 1 Demographics

Characteristic	Gomco ($N = 979$)	Mogen ($N = 718$)	P
Minor congenital genitourinary anomaly, n (%)	41 (4.2)	22 (3.1)	.21
Gestational age, wk, mean (range)	39.0 (31.1–42.3)	38.8 (31.4–42.3)	.01
Birth wt, g, mean (range)	3374 (1446–5471)	3317 (1440–5471)	.007
Age at circumcision, d, median (range)	1.45 (0.8–30.3)	1.48 (0.3–31)	0.55
Race, n			.28
White	939	683	
Asian American	21	18	
African American	9	0	
Other or unknown	18	17	
Insurance status, n			.42
Public	340	263	
Private	402	272	
Unknown	237	183	

TABLE 2 Gomco Versus Mogen: Complications and Revisions

Variable	Gomco	Mogen	<i>P</i>
Total procedures performed, <i>N</i>	979	718	
Total complications, <i>n</i> (%)	17 (1.73)	9 (1.25)	.54
Minor, <i>n</i>			
Prolonged bleeding	13	5	
Major, <i>n</i>			
Laceration	1	1	
Dehiscence	2	0	
Mucosal injury	1	0	
Hematomas	0	2	
Persistent bleeding requiring sutures	0	2	
Total revisions, <i>n</i> (%)	4 (0.41)	4 (0.56)	.73
Age at revision, mo	26.8	20.0	.38

rates of 12 of 730 (1.64%) and 5 of 249 (2.00%), respectively ($P = .90$). Also, attending physicians and residents using the Mogen clamp had similar complication rates of 8 of 567 (1.41%) and 1 of 151 (0.66%), respectively ($P = .09$).

The overall revision rate was 8 of 1697 (0.47%). Revision rates were similar for Gomco and Mogen groups ($P = .73$; Table 2) and also for attending physician and resident groups ($P = .07$; Table 3). The Gomco group's revision rate was 4 of 979 (0.41%), and residents had a higher rate of revision (2 of 249 or 0.80%) than attending physicians (2 of 730 or 0.27%; $P = .003$; Table 3). The Mogen group's revision rate was 4 of 718 (0.56%), and residents and attending physicians had similar revision rates at 0 of 249 (0%) and 4 of 567 (0.71%), respectively ($P = .61$). For both procedures, reasons for revision included redundant foreskin and inner foreskin adhesions. The aOR by logistic regression for revision when Mogen clamps were used instead of Gomco clamps was 1.61 (95% confidence

interval: 0.37–7.05). Older age at primary procedure was significantly associated with revision ($P = .03$). Five of 1546 (0.32%) newborns with circumcisions performed before 2 weeks of age underwent revision compared with 3 of 151 (1.99%) newborns with circumcisions performed after 2 weeks of age. Complication and revision rates were similar among preterm infants and term infants ($P = .54$ and $P = .123$, respectively).

Nine (0.53%) additional patients and families who initially sought revision instead underwent treatment of penile adhesions in which clobetasol, a topical corticosteroid, was used. After 30 days of treatment, 8 patients had their adhesions lysed by using gentle pressure in a clinic and did not pursue revision surgery. The family of 1 patient signed a consent for revision but decided to delay it for unknown reasons. Of the 9 revision cases, 5 (56%) had a primary circumcision by a Gomco clamp (Table 3). In comparing clobetasol use to avoid surgical revision, no differences were found for circumcision

technique ($P = .91$) or operator ($P = .20$). Patients with minor genitourinary anomalies were more likely to undergo clobetasol treatment (4 of 63 or 6.34% of patients) compared with patients without anomalies (5 of 1634 or 0.31%; $P = .0002$). In our regression analysis, newborns with a minor genitourinary anomaly had an aOR for undergoing revision of 33.8 (95% confidence interval: 7.31–162) after controlling for confounders, such as gestational age, weight, and age.

DISCUSSION

In our study, the use of Gomco and Mogen clamps in primary newborn circumcision was associated with equivalent complication and revision rates. Although demographic data, including age, race, and insurance status, were similar between the Gomco and Mogen groups, the Mogen group had a significantly lower gestational age and birth weight. This finding is expected because circumcisions in which the Mogen clamp is used can be performed when the infant is too small for the smallest presized Gomco clamp.

The overall revision rate of 0.47% is lower than rates of up to 5% that were reported in early studies^{8,10} but similar to a large 2014 study in which a 0.13% revision rate was reported.⁵ All cases of revision were due to unsatisfactory cosmesis. Surprisingly, attending physicians and residents had similar complication and revision rates, which could increase family confidence in procedures performed by residents with attending physician supervision. However, patients who had circumcisions performed by residents using Gomco clamps may be more likely to receive a revision compared with patients who had circumcisions performed by attending physicians using Gomco clamps. This suggests that circumcisions with the Mogen clamp may be easier for residents to learn and may have better procedural reproducibility. However, it is also possible that the number of circumcisions performed by residents was not large enough for us to detect a clinically significant difference. Patients with congenital genitourinary anomalies may also be more likely to undergo clobetasol

TABLE 3 Revision Rates by Level of Training

Variable	Attending Physicians, <i>n</i> of <i>N</i> (%)	Residents, <i>n</i> of <i>N</i> (%)	<i>P</i>
Total surgical revisions	6 of 1297 (0.46)	2 of 400 (0.5)	.07
After Gomco	2 of 730 (0.27)	2 of 249 (0.80)	.003
After Mogen	4 of 567 (0.71)	0 of 151 (0)	.61
Total No. clobetasol treatments	9 of 1297 (0.69)	0 of 400 (0)	.20
After Gomco	5 of 730 (0.68)	0 of 249 (0)	.35
After Mogen	4 of 567 (0.71)	0 of 151 (0)	.61

treatment of penile adhesions. The majority of patients who received this treatment did so successfully and did not require further revision.

This study is not without limitations. In previous studies, prominent suprapubic fat pads and penoscrotal webbing were associated with complications and revisions.¹¹ These features could not be analyzed in our study because they were not well documented. Given the retrospective study design, it is impossible to determine if patients in the nonrevision group had similar concerns for cosmesis but opted to not pursue revision. The number of patients who underwent revision was small (smaller than expected given early literature on this topic). However, because our institution is in a small geographic area, and because the only pediatric urologist practices within the same health system using the same electronic health record, a strength is that we likely captured the vast majority of patients seeking revision. Because the median age at revision was 25 months, it is possible that our study follow-up time was insufficient to capture revisions for patients who were <25 months of age at the time of data collection, which could potentially contribute to our study's low revision rate. Given the 780 patients in our study who were ≤25 months of age and our study's revision rate of 0.47%, we predict that 3 or 4 more patients may present for revision in the future.

Overall, this study reveals that elective newborn circumcision is associated with similar complication and revision rates after the use of either Gomco or Mogen clamps. Furthermore, pediatric residents can be adequately trained and supervised in performing the procedure because outcomes in our study were identical to those performed primarily by attending pediatricians.

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