

Endoscopic Gastrocnemius Recession: A Retrospective Analysis of Postoperative Complications and Results

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Statement of Purpose:

Gastrocnemius recession (GR) is a practical and effective procedure to address gastrocnemius equinus. There are two approaches for gastrocnemius recession procedures, open and endoscopic. At this point in time, endoscopic gastrocnemius recession (EGR) does not have an extensive amount of large scale studies investigating postoperative complications and results. The purpose of our study was to evaluate the safety and efficacy of endoscopic gastrocnemius recessions in a large, single surgeon series, looking specifically at the correction of ankle joint equinus deformity and postoperative morbidity.

Methodology:

- Patient Selection Strategy:
 - Patient selection time frame: From Jan. 2011 through Dec. 2018
 - All patients selected had undergone a GR by an associate physician at Foot and Ankle Associates, Ltd. (4650 SW Hwy, Oak Lawn, IL 60453)
 - Patients were identified from the practices EMR using the CPT code 27687 (gastrocnemius recession)
 - The collected data revealed that 121 patients (122 lower limbs) who had undergone a GR procedure during the selected time frame
 - The medical records of the patients were then reviewed by 4 of the authors for preoperative ankle joint dorsiflexion ROM of <5°, GR surgical technique, and physician who performed the surgery
- General inclusion criteria:
 - EGR was performed for equinus deformity correction,
 - EGR was performed by Dr. John Grady (all EGR procedures were dual portal technique)
 - Patient age was >18yo,
 - Patient had at least 6 mo. follow up
- General exclusion criteria:
 - OGR performed for equinus correction
 - EGR performed by surgeon other than Dr. John Grady
 - Achilles tendon repair performed in conjunction with GR
 - Patient age <18yo
 - Patient had <6 mo. follow up
- Initial screening brought the number of eligible subjects from 121 patient to 71 patients



Figure 1. Images from an endoscopic gastrocnemius recession procedure

Methodology Continued:

- Further patient screening process was required for accurate postoperative assessment grouping
 - Not all 71 patients were eligible for functional assessment postoperatively. A patient was excluded from this grouping if either of the following was missing:
 - Pre-op ankle joint dorsiflexion
 - Post-op ankle joint dorsiflexion ROM (assessed for at least 6 months post-op)
 - Not all 71 patients were eligible for postoperative morbidity assessment. A patient was excluded from this grouping if either of the following was present:
 - Prior sural nerve injury
 - Abnormal lower leg neurological sensation
 - Peripheral neuropathy proximal to the midfoot
- It is important to note that if a patient wasn't eligible for the functional assessment group due to exclusion criteria, it did not also make them ineligible for the postoperative morbidity group, and vice versa.
- After the second round of the patient screening process, the 2 postoperative assessment groups were formed
 - Functional assessment group: n=36 limbs
 - Postoperative morbidity group: n= 55 limbs
- The medical records of the eligible patients were then reviewed by 4 of the authors, looking specifically at postoperative ankle joint dorsiflexion ROM and/or postoperative complications
- Postoperative Assessment
 - 2 categories the patients were being assessed for:
 - Functional assessment
 - Improvement in ankle joint dorsiflexion ROM
 - Postoperative morbidity
 - Neurological injury
 - True postoperative neurological injury was determined to be any change in postoperative LE neurological sensation that was not present preoperatively and that did not resolve during the patient's follow up period post surgery

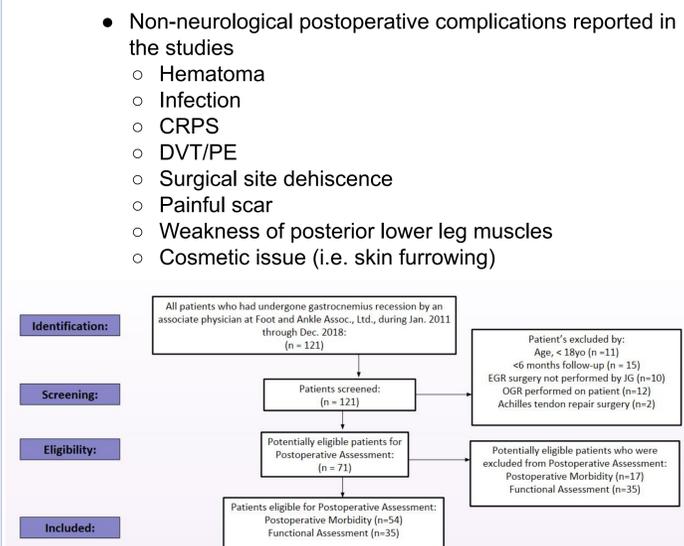


Figure 2. Diagram of patient selection process

Results:

- Functional Assessment
 - Assessing the amount of equinus deformity correction
 - 36 total limbs evaluated
 - Average increased ankle joint dorsiflexion ROM: 22.8° ± 7.96°
 - Statistically significant increase in dorsiflexion ROM, P<.0001
- Postoperative Morbidity
 - Neurological injury assessment
 - 1 out of 55 limbs experienced a true nerve injury
 - 1.81%
 - Sural nerve injury
 - Non-neurological complications
 - 0 out of 55 limbs had a postoperative complication
 - 0.00%
- Literature review
 - Our rate of neurological injury was right in line with what was seen in previous studies
 - 1.56% vs 1.81% (Avg. of previous EGR studies vs Our study)
 - Our rate of total postoperative complications was 5% less than what was seen on previous EGR studies
 - 6.87% vs 1.81% (Avg. of previous EGR studies vs Our study)

Ankle Joint Dorsiflexion ROM		
Variable	Overall (n= 36, 100%)	p-value
Avg. Age(yo) ± SD	62 ± 13.18	
Male Gender	20 (55%)	
Avg. F/U time(mo) ± SD	20.9 ± 13.07	
Avg. Pre-op ROM ± SD	-12.44 ± 7.1	
Avg. Post-op ROM ± SD	10.39 ± 2.32	
Avg. Total Increase in ROM ± SD	22.8 ± 7.96	<.0001

Figure 3. Postoperative ROM results

Postoperative Complications		
Variable	Non-nerve related post-op complications (n= 55, 100%)	Nerve related post-op complications (n= 55, 100%)
Avg. Age(yo) ± SD	62.25 ± 15.55	62.25 ± 15.55
Male Gender	25 (46%)	25 (46%)
Avg. F/U time (mo) ± SD	20.14 ± 14.13	20.14 ± 14.13
Total Post-op complications	0	1
Total % of patients injured	0.00%	1.81%

Figure 4. Postoperative complication results

Complications of Gastrocnemius Recession from Literature Review		
Listed Complications	Open GR	Endoscopic GR
Limbs evaluated	593	640
Lower Leg Weakness	27	20
Neuritis/Dysesthesia/Neurological Injury	13	10
Cosmetic Issue (i.e. skin furrowing)	8	10
Infection (superficial/ deep/ abscess)	9	1
Dehiscence	9	1
Hematoma	3	2
DVT/PE	4	0
CRPS	3	0
Painful Scar	1	0
Total Complications	77	44
Postoperative Complication Rate	12.98%	6.87%

Figure 5. Postoperative complication results from literature review of OGR procedures vs EGR procedures

Discussion:

In this EGR retrospective analysis, we found that there was statistically significant improvement in ankle joint dorsiflexion ROM (22.8° ± 7.96°) postoperatively. This statistically significant increase in postoperative ankle joint ROM was also seen in previous studies examining EGR procedures.

In terms of postoperative neurological complications, our rate of neurological injury, 1.81%, was right in line with what was seen in previous previous EGR studies (an average neurological injury rate of 1.56%).

As for postoperative morbidity, our rate of overall postoperative complications, 1.81%, was roughly 5% lower than what was seen in previous EGR studies (an average rate of 6.87%).

Unfortunately, one of the biggest weaknesses of our study was a lack of a control group. This was due to the scarcity of OGR procedures performed by physicians at Foot and Ankle Associates, Ltd. during the studies time frame. For this reason, we were unable to directly compare the results of EGR procedures with OGR procedures, but an extensive literature review on past EGR and OGR studies was performed to help assess if there was any advantage to performing EGR vs OGR.

From our literature review it appears that the complication rates after OGR procedures were reported to range from 0% to 61%, with an average of 12.98%. While the complication rates after EGR procedures were reported to range from 0% to 16.66%, with an average of 6.87%. Thus, it was found that a surgeon is twice as likely to encounter a postoperative complication with an OGR procedure vs an EGR procedure.

In terms of neurological injuries, we found that EGR had a slightly lower true neurological injury rate compared to OGR (1.56% vs 2.19%, respectively), but it had a nearly 30% higher postoperative resolution of described neurological injuries when compared to OGR procedures.

Conclusion:

The results of this investigation support that EGR is a safe and effective procedure for the treatment of equinus deformity. The amount of postoperative ankle joint ROM improvement was statistically significant and our complication rate was similar or superior to rates seen in previous EGR studies. Endoscopic gastrocnemius recession should be strongly considered as a primary surgical option for addressing gastrocnemius equinus in all patients, and even more so when dealing with a patient at greater risk for postoperative complications

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