Role of Target Specific Oral Anticoagulation After Operative Management of Venous Thoracic Outlet Syndrome

Jeontaik Kwon, MD, Paul DiMuzio, MD, Babak Abai, MD, Dawn Salvatore, MD, Taki Galanis, MD, Geno Merli, MD, Luis Eraso, MD
Division of Vascular and Endovascular Surgery, Thomas Jefferson University Hospital, Philadelphia, PA, USA

Background

The purpose of this study is to review the efficacy of Target Specific Oral Anticoagulants (TSOAC) versus vitamin K antagonist (VKA) for post-surgical anticoagulation in patient with primary subclavian vein thrombosis. Rivaroxaban, a factor Xa inhibitor, was the first TSOAC approved by the FDA in 2012 for the treatment and prevention of deep vein thrombosis. However, the efficacy and safety of TSOAC for prevention of recurrent deep vein thrombosis after revascularization of upper extremity compression syndromes is largely unknown.

Methods

Twenty-two patients who underwent surgical intervention for axillosubclavian vein thrombosis from 2009 to 2015 at our institution were retrospectively reviewed. Standard protocol with short term anticoagulation treatment was given after combination of surgical intervention including catheter directed lysis, balloon angioplasty, mechanical thrombectomy, and first rib resection. Fourteen patients (64%) received warfarin and 8 patients (36%) received rivaroxaban for post-operative anticoagulation regimen and followed up with ultrasound.

Table 1: Demographic data

	Warfarin (n= 14)	Rivaroxaban (n=8)	p
Avg. Age (yr)	32	28	.38
Male sex	11 (78.6%)	6 (75%)	
Cr clearance (g/dL)	1.0 (0.5-1.2)	0.9 (0.8-1.0)	.14
Time of onset of symptoms			
< 14 days	10	8 (100%)	
> 14 days	4	0 (0%)	
Thrombophilic condition	0	1*	

*Factor V Leiden Deficiency

Table 2: Characteristics of treatments/follow-up

	Warfarin (n= 14)	Rivaroxaban (n=8)	p
Types of Intervention			
CDL	10 (71.4%)	8 (100%)	.1036
Mechanical thrombectomy	4 (28.6%)	5 (62.5%)	.1312
Angioplasty	11 (78.6%)	8 (100%)	.1744
Rib resection	13 (92.9%)	8 (100%)	.4632
Mean follow up (range)	96 days (35-176 days)	114 days (67-175 days)	.1744
Mean duration of treatment	150 days (70-484 days)	112 days (91-132 days)	.2910

Table 3: Treatment Outcome

	Warfarin (n= 14)	Rivaroxaban (n=8)	p
Symptoms < 14 days	10	8	ns
Pre-Lysis subclavian vein	9 (Occlusive) 1 (Non-occlusive)	75% (Occlusive) 25% (Non-occlusive)	
Post Lysis subclavian vein	10 (patent)	8 (patent)	ns
Symptoms > 14 days	4	0	ns
Patency at venogram after thoracic decompression	14	8	
Patency at Follow-up	14	8	ns
Complications			
Minor complication	0	0	ns
Major complication	1†	1†	ns
LOS††	2.6 +/- 1.4	2.5 +/- 0.7	0.83

† Hemothorax
†† Length of stay after thoracic decompression procedure

Results

There was 100% success in maintaining patency at the time of initial follow-up ultrasound in both groups. Average age in warfarin and rivaroxaban was 32 years (range 17-59 years) and 28 years (range 15-47 years), respectively. The mean creatinine level was 1.0 g/dL (warfarin) and 0.9 g/dL (rivaroxaban). In warfarin group, the mean therapeutic period was 150 days (range 70-484 days) with mean follow-up interval of 96 days (range 35-176 days) for ultrasound examination. In rivaroxaban group, mean therapeutic period was 112 days (range, 91-132 days) with follow-up interval of 114 days (range, 67-175 days). There were no major bleeding complications associated with medication during therapeutic period in both groups. Each group had one immediate post-operative complication of hemothorax. Mean post-operative length of stay was 2.6+/-1.4 days in warfarin group and 2.5+/-0.7 days in rivaroxaban group.

Conclusion

Selective usage of novel oral anticoagulants in post-operative patient with axillo-subclavian vein thrombosis revascularization is a safe and convenient alternative option with non-inferior outcomes compared to traditional vitamin K inhibitor.

References

1. Wells, P., Forgie, M., Rodger, M., *Treatment of Venous Thromboembolism*. JAMA 2014;311(7):717-728
2. Kucher, N. *Deep Vein Thrombosis of the Upper Extremities*. NEJM. 2011;364:861-9
3. Joffe, H. Goldhaber, S. *Upper-Extremity Deep Vein Thrombosis*. Circulation. 2002;106:1874-1880
4. Lefebvre, P., Coleman, C., Bookhart, B., Wang, S., Mody, S., Tran, K., Zhuo, D., Huynh, L., Nutescu, E. *Cost-effectiveness of rivaroxaban compared with enoxaparin plus a vitamin K antagonist for the treatment of venous thromboembolism*. Journal of Medical Economics. 2014;17(1):52-64
5. EINSTEIN investigators. *Oral Rivaroxaban for Symptomatic Venous Thromboembolism*. NEJM. 2010;363:2499-510
6. Engelberger, R., Kucher, N. *Management of Deep Vein Thrombosis of the Upper Extremity*. Circulation. 2012;125:768-773.
7. Diamantopoulos, A., Lees, M., Wells, P., Forster, F., Ananthapavan, J., McDonald, H. *Cost-effectiveness of rivaroxaban versus enoxaparin for the prevention of postsurgical venous thromboembolism in Canada*. Thromb Haemost. 2010;104:760-770.