



# RIVAROXABAN VERSUS ENOXAPARIN IN TRAUMATOLOGY : A PHARMACO-ECONOMIC STUDY

W. ENNEFFAH<sup>1</sup>, M.A. EL WARTITI<sup>1</sup>, A. CHEIKH<sup>2</sup>, A. BENNANA<sup>3</sup>, J. LAMSAOURI<sup>1</sup>, N. CHERKAOUI<sup>1</sup>.

<sup>1</sup> MOHAMMED VI UNIVERSITY OF RABAT - FACULTY OF MEDICINE AND PHARMACY, MEDICINE SCIENCES, RABAT, MOROCCO.

<sup>2</sup> CHEIKH ZAID INTERNATIONAL UNIVERSITY HOSPITAL, PHARMACY, RABAT, MOROCCO.

<sup>3</sup> CHEIKH KHALIFA IBN ZAID INTERNATIONAL UNIVERSITY HOSPITAL, PHARMACY, CASABLANCA, MOROCCO.



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**Keywords :** Rivaroxaban, Enoxaparin, Traumatology, Postoperative prophylaxis, Pharmacoeconomics.

**Background and importance :** Rivaroxaban is an orally active factor Xa inhibitor anticoagulant. Previous studies have shown that it is similar to enoxaparin in terms of efficacy and safety for the prevention of venous thromboembolic events in adult patients in whom a Total Hip Prosthesis (THP) or Total Knee Prosthesis (TKP) was implanted. In terms of cost optimization, the hospital pharmacist, in his role of advisor, must rely on scientific and economic arguments to justify the therapeutic choices and their consequences on both hospital and patient.

**Aim and objectives :** This work aims to compare costs associated with the use of rivaroxaban and enoxaparin in post-prosthetic prophylaxis, the efficacy of which has been judged to be comparable through the data in the literature. The objective being the enlightened choice of efficient therapeutic strategies in which the hospital pharmacy is a major stakeholder.

**Material and methods :** This is a comparative study of two anticoagulant molecules: rivaroxaban dosed at 10 mg/day per os and enoxaparin dosed at 40 mg/day subcutaneously (originator and generic) as to the cost of postoperative prophylaxis against venous thrombosis which lasts five weeks for THP and two weeks for TKP.

**Results :** Analysis of the two originators prices shows that treatment cost with rivaroxaban is 27€ after THP, and 11€ after TKP. For enoxaparin, it is 199€ after THP and 80€ after TKP. Concerning the cost of the generic treatment, it is 139€ after a THP and 56€ after a TKP. Rivaroxaban compared to enoxaparin shows an average saving of 171€/patient for the originator and 112 €/patient for the generic after placement of THP and 69€/patient for the originator and 45€/patient for the generic after placement of a TKP. In addition to the direct economic advantage, rivaroxaban would have other advantages regarding the various indirect costs generated by the injectable route (biological monitoring, home administration constraints, etc.).

**Conclusion and relevance :** The results show that the cost/effectiveness balance of oral rivaroxaban would be advantageous compared to enoxaparin subcutaneously. This type of work has the advantage of guiding actors involved in making strategic decisions at hospital level.

## BACKGROUND AND IMPORTANCE

Rivaroxaban is an anticoagulant with good oral bioavailability, acting as a highly selective direct inhibitor of Xa coagulation factor. In traumatology, it is indicated for the prevention of venous thromboembolic events in adult patients undergoing planned surgery for the placement of a total hip prosthesis (THP) or a total knee prosthesis (TKP).

Previous studies have shown that it is similar to enoxaparin in terms of efficacy and safety for the aforementioned indication. In terms of cost optimization, the hospital pharmacist, in his role of advisor, must rely on scientific and economic arguments to justify the therapeutic choices and their consequences on both hospital and patient.

## AIM AND OBJECTIVES

This work aims to compare costs associated with the use of rivaroxaban and enoxaparin in post-prosthetic prophylaxis, the efficacy of which has been judged to be comparable through the data in the literature. The objective being the enlightened choice of efficient therapeutic strategies in which the hospital pharmacy is a major stakeholder.

## MATERIAL AND METHODS

The elements used as a basis for the comparison are as follows :

❖ Duration of postoperative venous thromboembolic prophylaxis :

Molecules	Hip replacement surgery	Knee replacement surgery
Rivaroxaban 10 mg	5 weeks	2 weeks
Enoxaparin 40 mg	5 weeks	2 weeks

❖ Recommended dosage :

Molecules	Hip replacement surgery	Knee replacement surgery
Rivaroxaban 10 mg	1 tablet per day	1 tablet per day
Enoxaparin 40 mg	1 injection per day	1 injection per day

❖ Treatment cost per patient :

Molecules	Unit price (€)	Treatment cost (€)	
		THP	TKP
Rivaroxaban 10mg	0,78	27.30	10.92
Enoxaparin 40mg (Princeps)	5,70	199.50	79.80
Enoxaparin 40mg (générique)	3,99	139.65	55.86

❖ Indirect costs related to the use of enoxaparin :

Biological tests unit cost		Average cost of home administration	
		THP	PTG
Platelet count	3,14 €		
aPTT	4,19 €		
INR	5,71 €	2 € x 35 days	2 € x 14 days

## RESULTS

Rivaroxaban versus enoxaparin :

### 1- Efficacy

Rivaroxaban 10mg started 6 to 10 hours after the operation is more effective than an injection of enoxaparin 40mg in terms of reducing thromboembolic events.

### 2- tolerance

Rivaroxaban has a similar tolerance to enoxaparin for major bleeding events.

### 3- Ease of use

Compared to enoxaparin, rivaroxaban has the following advantages :

- ✓ oral administration ;
- ✓ no contraindication for the relay with rivaroxaban after thromboprophylaxis with enoxaparin during hospitalization (improved adherence to home treatment) ;
- ✓ no dosage adjustment according to weight, sex, age or in case of mild and moderate renal insufficiency ;
- ✓ no routine biological monitoring.

### 4- Economic aspects

▪ Cost of treatment with rivaroxaban vs enoxaparin (originator and generic) after hip arthroplasty :

Costs (€)	Rivaroxaban 10mg	Enoxaparin 40mg (originator)	Enoxaparin 40mg (generic)
Direct	27.30	199.50	139.65
Indirect* (biological monitoring + administration cost)	00	83.04	83.04
Total	27.30	282.54	222.69

\*based on a single test at the start of treatment

▪ Cost of treatment with rivaroxaban vs enoxaparin (originator and generic) after knee arthroplasty :

Costs (€)	Rivaroxaban 10mg	Enoxaparin 40mg (originator)	Enoxaparin 40mg (generic)
Direct	10.92	79.80	55.86
Indirect* (biological monitoring + administration cost)	00	41.04	41.04
Total	10.92	120.84	96.90

\*based on a single test at the start of treatment

## CONCLUSION AND RELEVANCE

The results show that rivaroxaban might be similar to enoxaparin in terms of efficacy and tolerance, but remains a cost-effective treatment option. Therefore the use of oral rivaroxaban would be advantageous compared to injectable enoxaparin. This type of work has the advantage of guiding actors involved in making strategic decisions at hospital level.

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