SESSTIM
UMR912 / Inserm / IRD
Université AIX-MARSEILLE
Sciences Economiques & Sociales de la Santé
& Traitement de l'Information Médicale

Cost Evaluation / STIC COELCO

Conventional laparoscopy
vs
Robotic-assisted laparoscopy
in gynaecological cancers

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CONTEXT

- Innovations often increase the cost of medical strategies without radically improving the outcome

- Economic impact of the diffusion of the robotic technique
  - High cost: Purchase/Maintenance/Instruments
  - Higher operative time = Higher operating room costs
  - Potentialy cost-savings: Length of hospitalization ?

- Benefits for the patients
  - Better QOL ? Pain reduced ?
  - Faster RTW ?
  - Morbidity ? Complications ?

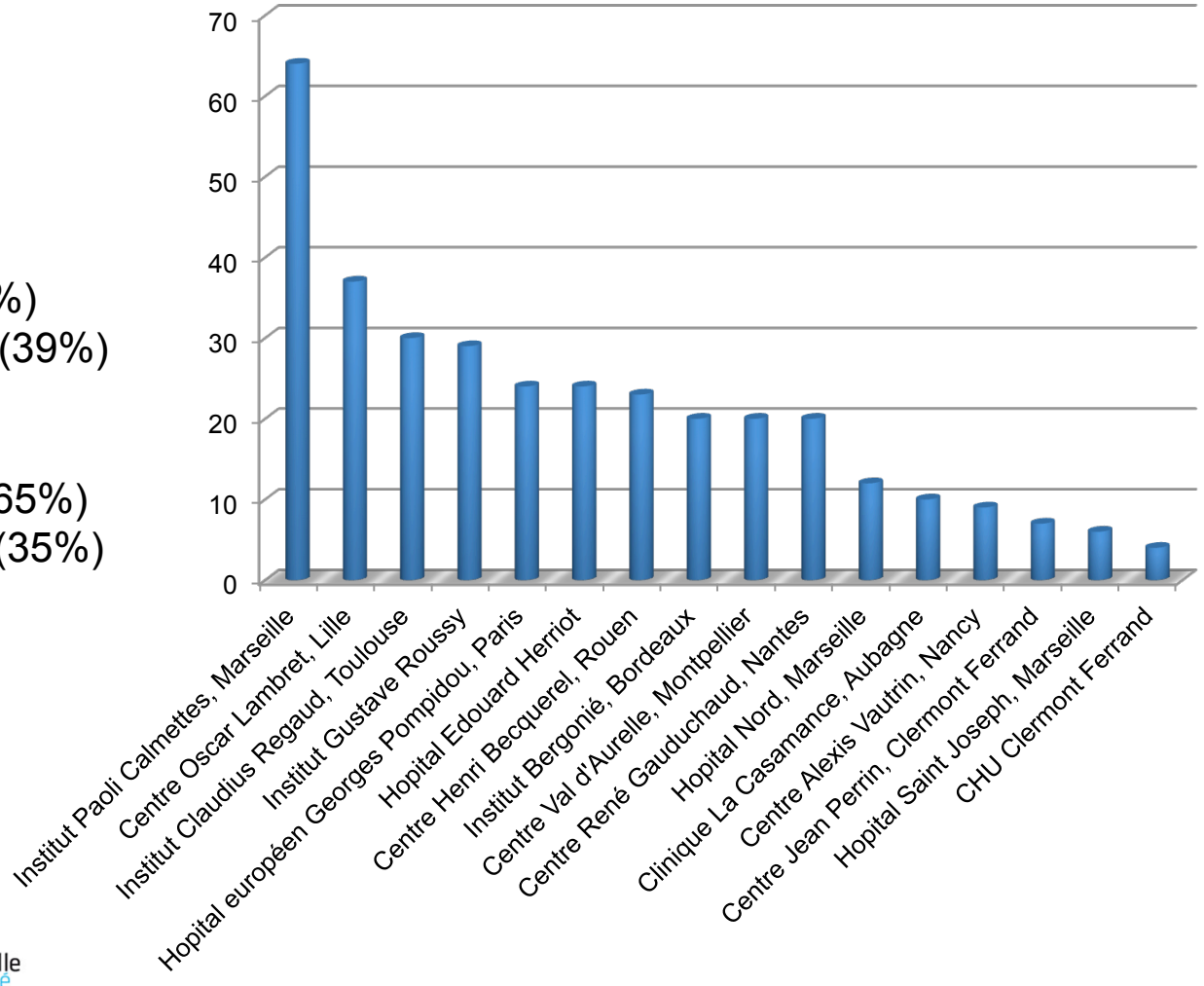
STIC COELCO / *Cost evaluation of Conventionnal Lap vs Robot Assisted Lap in Gynaecological Malignancies*

16 centers

339 patientes

Indications:
Cervical Cancer n=206 (61%)
Endometrial Cancer n=129 (39%)

Surgical approaches:
Conventionnal Lap n=226 (65%)
Robotic assisted Lap n=80 (35%)



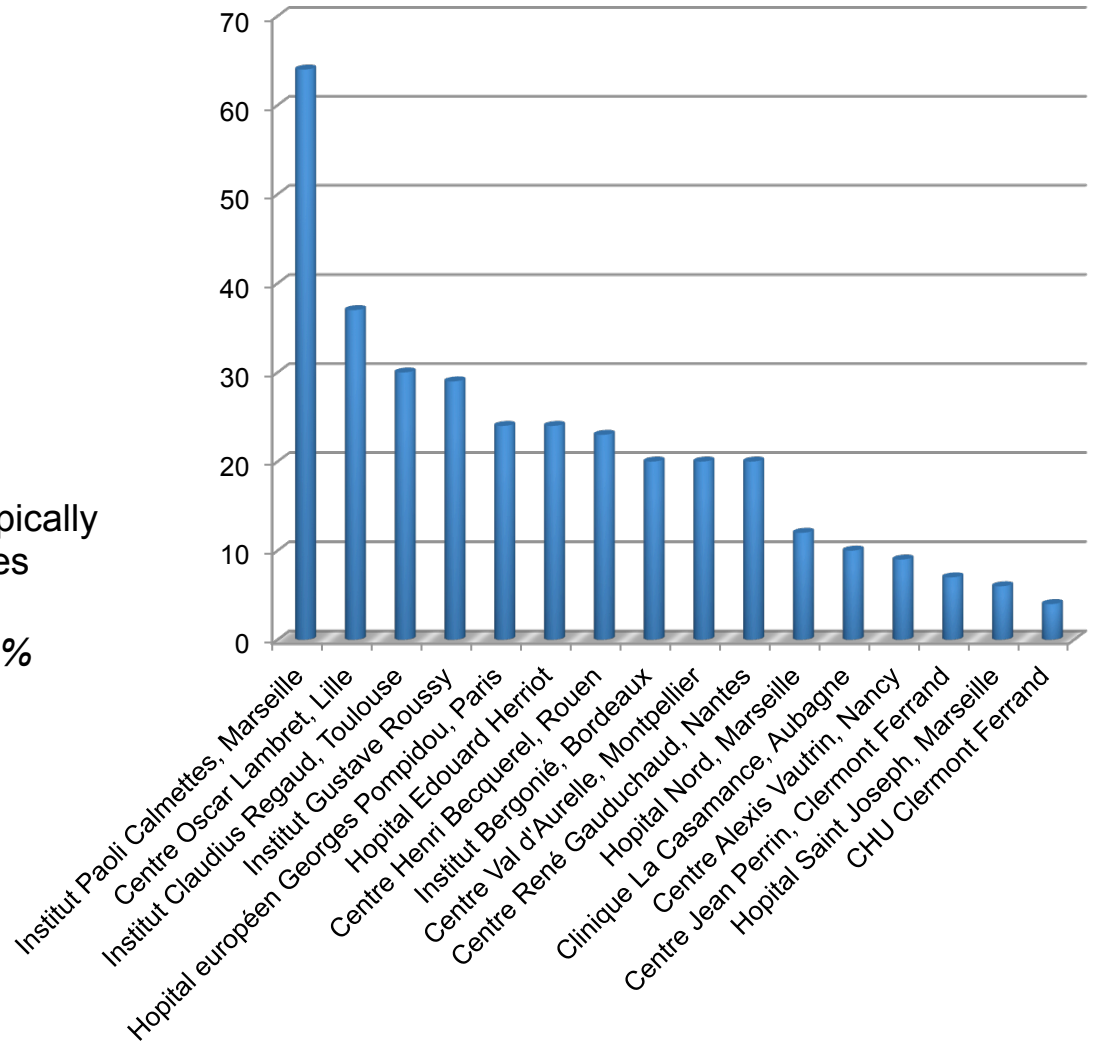
STIC COELCO / *Cost evaluation of Conventionnal Lap (CL) vs Robot Assisted Lap (RAL) in Gynaecological Malignancies*

- **Objective:** To compare costs associated with RAL *vs* CL in gynaecological cancers

  - French multicentric study between 2007 and 2010
    - 2 years of follow up

  - Inclusion criteria
    - Patients managed laparoscopically for gynecological malignancies
      - *Cervical Cancer 61%*
      - *Endometrial Cancer 39%*

  - Patients n=306
    - Robotic lap : n=80
    - Conventional lap: n=226



OBJECTIVE

- **To compare costs associated with robotic assisted laparoscopy *vs* conventional laparoscopy in gynaecological cancers**
  - French multicentric study between 2007 and 2010
  - 2 years of follow up
  - Inclusion criteria
    - Patients managed laparoscopically for gynecological malignancies
  - Patients : n=306
    - Robotic lap : n=80
    - Conventional lap: n=226

METHODS (1)

- Costs calculated using the **micro-costing method**
  - Detailed measurement of resource consumption (in physical quantites) for all the patients included in the analysis
  - Monetary valuation using unit cost data

- Factors which were not shown to be different between the 2 strategies were not included
  - Cost of conversion; management of complications; transfusion costs; medication costs

METHODS (2)

1. **Robot-specific direct costs**
   - **Fixed costs**
     - Purchase cost of the robot
     - Yearly maintenance cost
   - Depend on the number of cases performed and the amortization of equipement

2. **Factors that drive cost differences between the 2 strategies**
   - Surgical supplies
   - Operating room costs
   - Hospitalization costs

RESULTS (1)

1. Robot-specific costs : ***2 213€ cost per intervention***

given an average of **165** cases performed per year

- ***Purchase cost of the robot***: 1 554 800€

= 222 114€/year when amortized over a 7-year period

- ***Yearly maintenance cost***: 143 000€/year

2. Factors that drive cost differences between the 2 strategies

Cost (euros)	**Surgical Supplies**	**Hospitalization**	**Operative room**
CL	1432	2841	1311
RAL (+2213)	957	2380*	1490
p	**<0,001**	**<0,001**	**0,0004**

*due to a reduced time spent in the intensive care unit (0.38 days vs 0.85 days)

Extra Cost (165 procedures) = 1456 euros

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RESULTS (2)

- **Hospitalization cost**
  - 2,380€ € for the robotic strategy

  vs

  - 2,841€ for the conventional laparoscopy

p<0.001

➢ due to a reduced time spent in the intensive care unit (0.38 days vs 0.85 days)

- **Operative room cost**
  - Increased lenght of procedure for the robotic strategy: 4.38h vs 4.98h
  - labor cost : 1,311€ *vs* 1,490€, p=0.0004

RESULTS (2)

Evaluation of pain (Analogue Visual Scale)

No differences between both groups

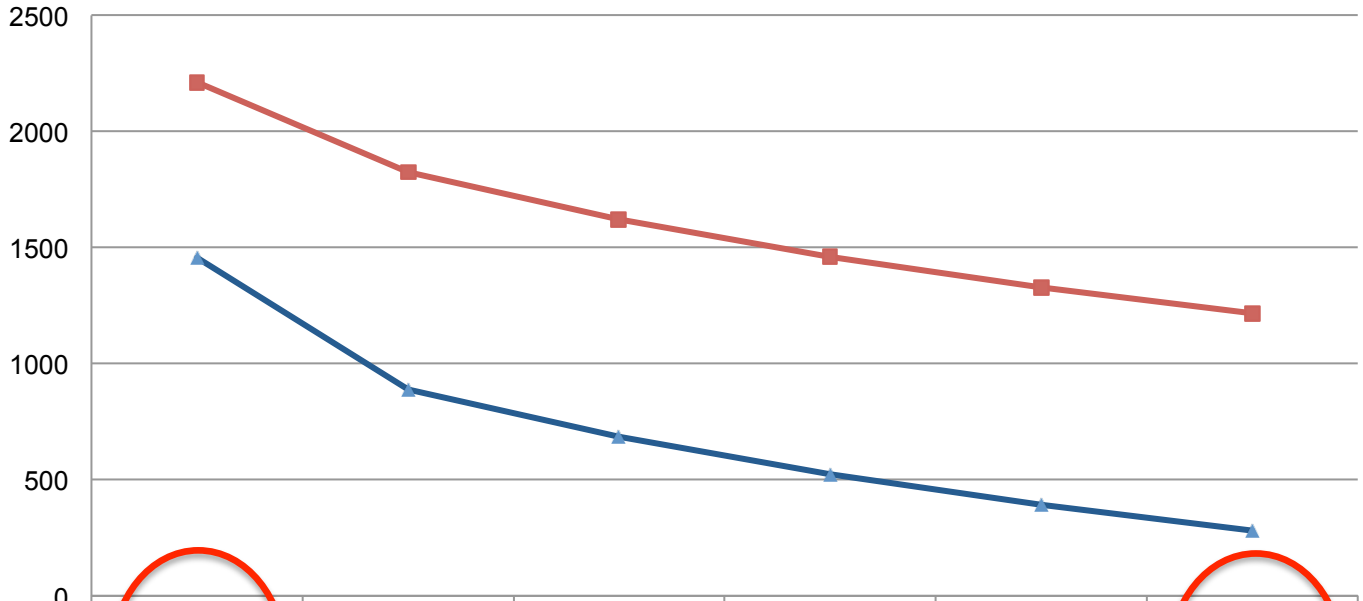
- *Pré-intervention* :
  - 3.12 vs 2.07 ; p=0.438
- *1 month post intervention*
  - 4.55 vs 3.79 ; p=0.685
- *3 months post intervention*
  - 2.03 vs 2.47 ; p=0.648

CONCLUSION

- **The total extra-cost was 1,456€ per intervention** (165 robotic procedures/year)
- The most important driver of additional cost is the fixed costs of the robot (purchase price + maintenance)
- The robot-specific costs were not overcome by reduced room costs

Sensibility Analysis

Extra-cost according to the number of procedures



	165	200	225	250	275	300
Robot + maintenance	2213	1825	1622	1460	1327	1217
Extra-cost*	1456	889	686	524	391	281

***Hypothesis:**

Conv Lap Operative time = Robot Assisted Lap

Conv Lap Hospitalization cost > Robot Assisted Lap Hospitalization cost (2841€ vs 2380€)

Conv Lap supplies' cost > Robot Assisted supplies' cost (1432€ vs 957€)

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LIMITATIONS

- *Morbidity* and *complications* not integrated in the analysis
  - ➢ will have a financial impact
  - ➢ Ongoing randomized french multicentric study

- Cost valorisation made from a *single institution*
  - Fixed costs of the robot are linked to the number of case per year
  - Daily costs of hospitalisation may vary between institutions, linked for example to the volume of interventions

ROBO-GYN-1004

GYNECO-ONCOLOGY PERI-OPERATIVE MORBIDITY : CONVENTIONAL LAPAROSCOPY VERSUS ROBOTICALLY ASSISTED LAPAROSCOPY

SPONSOR: Centre Oscar Lambret - Lille
Coordonnator : Fabrice NARDUCCI (Centre Oscar Lambret – Lille) -CRG
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OBJECTIVES -1st

OBJECTIVES	ASSESSMENT CRITERIA
Primary	
To compare the perioperative morbidity after 6 months of traditional laparoscopy and robotically assisted laparoscopy	The peri-operative morbidity will be assessed according to the number of complications after 6 months: per-operative bleeding, urinary or digestive wounds, damage to the obturator nerves and the genito-femoral nerve, lymphatic complications (symptomatic or non-symptomatic lymphocele and lymphœdema).

OBJECTIVES -2nd

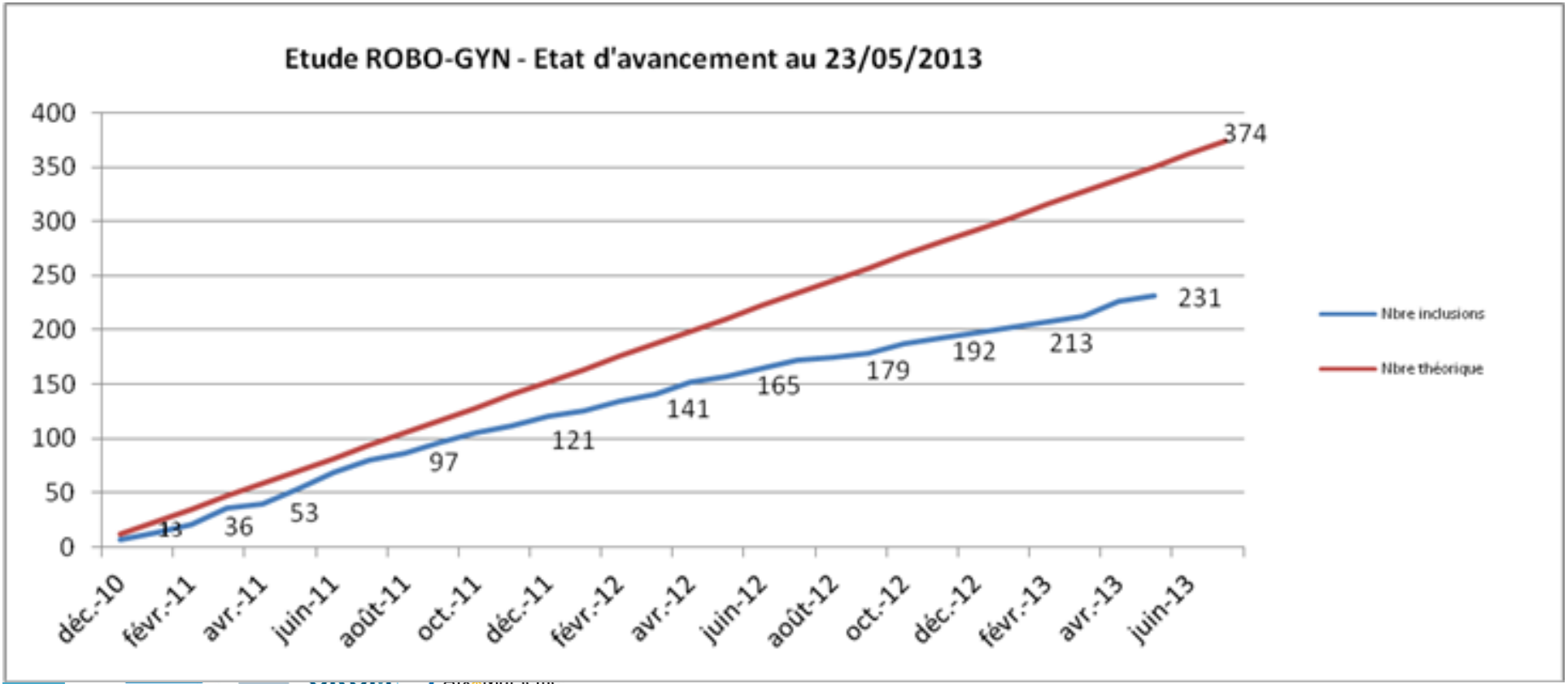
OBJECTIVES	ASSESSMENT CRITERIA
Secondary	
To report the per-operative data **To assess the anaesthesia data, in particular ventilation**	Per-operative data: Length of time spent in the operating theatre Skin to skin time in the operating theatre Time spent at the console by the surgeon carrying out the robot assisted laparoscopic procedure Per-operative haemorrhage (given the problems calculating small losses, the quantity of the aspiration cleaning liquid will be ascertained before and after use) Coelioconversion for the robot group (grounds) Laparoconversion (grounds)

OBJECTIVES -2nd

OBJECTIVES	ASSESSMENT CRITERIA
Secondary	
To quantify the standardised post-operative analgesia	The anaesthesia and ventilation parameters will be encoded for both approaches and recorded: (% carbonemia upon induction and per-operatively, degree of Trendelenburg, intraperitoneal pressure of the pneumoperitoneum taken every 15 minutes, intracorporal temperature…) Standardised post-operative analgesia
To assess the quality of life	SF-36
To assess the ergonomy, efficacy and comfort for the surgeon	Borg NASA-TLX

Ongoing study

- Date of first inclusion : 3-12-2010
- Today: 231 inclusions



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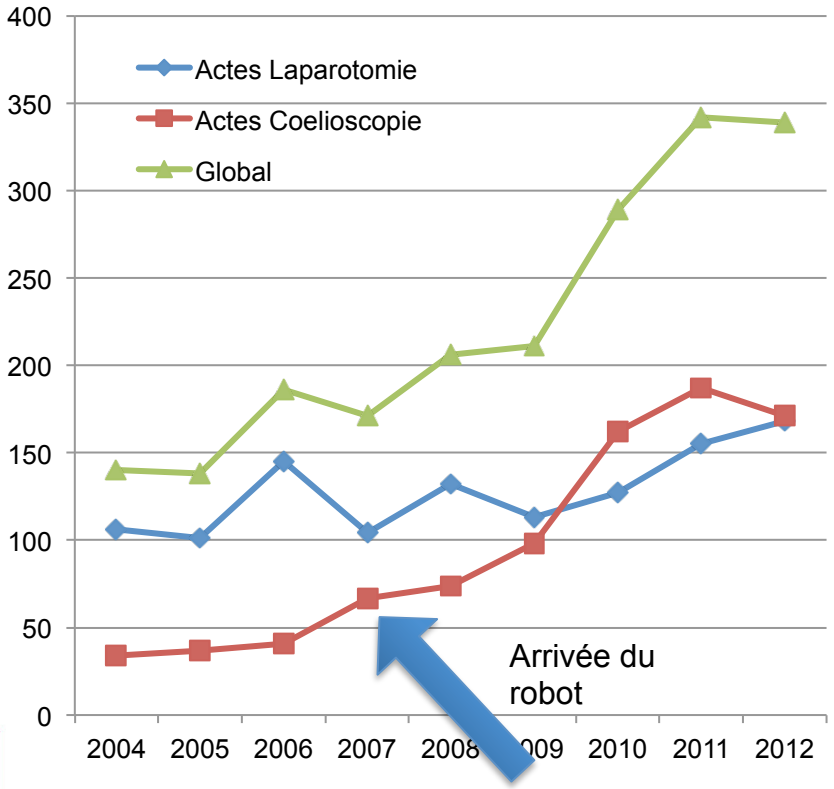
PERSPECTIVES

- From a societal perspective, some benefits not assessed in this study may occur to support the implementation of robotic surgical strategies in hospitals
    - a positive impact on economics provided by a **faster RTW** ?
    - **QOL** has been shown to be improved (*Yuh et al. BJU Int 2009*)

- **Shorter learning curve**
    - potential decreased operating time
    - development of minimal invasive approaches

Quel rôle peut avoir le robot sur les habitudes chirurgicales d'un département de chirurgie oncologique?

L'AR participe au développement des autres techniques minimales invasives



Evolution des voies d'abord chirurgicales de 2004 à 2012 pour la réalisation des HTAB LP ou curages isolés à l'IPC-Marseille

Gain lié au changement de pratiques?

Durée d'hospitalisation
Taux de conversion / CL
Complications post opératoire
Turn over des patients / Ambulatoire (CL)
Activité?

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In Press

Hospital costs for robot-assisted laparoscopic radical hysterectomy and pelvic lymphadenectomy

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Table 2
Mean hospital costs for a radical hysterectomy and pelvic lymphadenectomy performed by robot-assisted laparoscopy (in chronological order) or open surgery at a single institution.

	$/unit	Open	Robot 1–30	Robot 31–60	Robot 61–90	Robot 91–120	Robot 121–150	Robot 151–180
OR time (minutes)[a]	26.0	299	406	334	323	288	260	277
(Skin-to-skin minutes)		(233)	(314)	(245)	(232)	(201)	(185)	(201)
Post operative stay (days)[a]	549	7.3	5.5	3.6	3.8	3.5	3.3	2.4
Admittance fee [a]	662	1.1	1.2	1.0	1.2	1.2	1.2	1.1
Erythrocyte concentrate[a]	150	1.0	0.2	0.2	0.0	0.1	0.1	0.0
Laparotomy-associated cost[a]	309	1.1	0.1	0.0	0.1	0.1	0.1	0.1
Robot-associated cost[b]	920	0	1	1	1	1	1	1
Robot investment cost[c]	839	0	1	1	1	1	1	1
Robot maintenance cost	402	0	1	1	1	1	1	1
Robotic instruments	385	0	4.61	4.20	3.97	3.83	3.40	3.40
Total cost ($)		12,986	18,382	15,174	14,988	13,924	12,917	12,759
p value[d]			<0.001	0.006	0.016	NS	NS	NS

NS = non-significant.
[a] Includes readmissions and reoperations. OR time is defined from patient's entry to patient's departure from the OR. Surgical time (skin-to-skin time) is presented in parenthesis.
[b] Robot-associated cost includes robot draping, sterilization of instrument and disposable assistant's instruments.
[c] Robot investment cost based on seven years depreciation and 400 procedures/year.
[d] Two-sided unpaired student t-test with Bonferroni adjustment.

Given 400 robotic operations annually, and only after a substantial implementation period, it is feasible to perform robot-assisted radical hysterectomy at an equal hospital cost compared with open surgery.

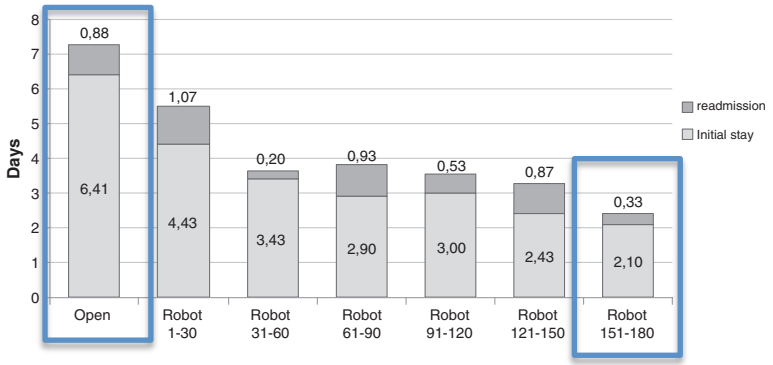
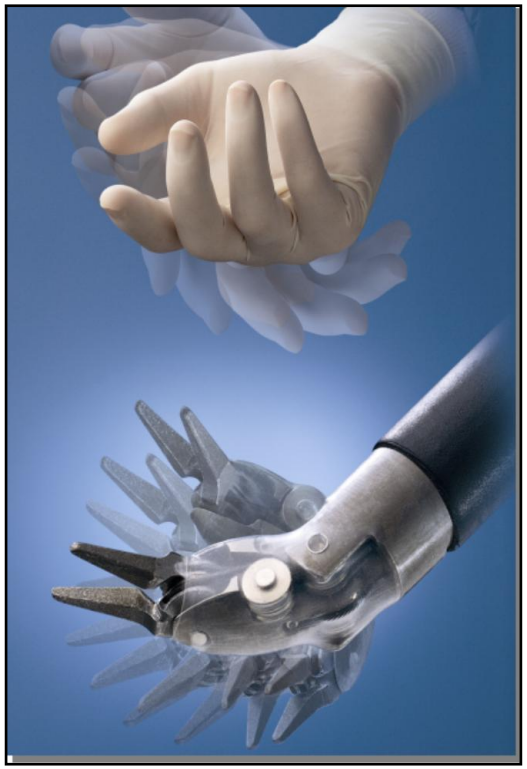


Fig. 2. Mean postoperative hospital stay, including all related readmissions until three months after surgery, following open or robot-assisted laparoscopic (in chronological order) radical hysterectomy and pelvic lymphadenectomy.

Conclusion: Why using the robot?

- Technical advantages and futures evolution
- Easier to learn: shorter learning curve than conventional laparoscopy
- Easier to teach: standardization of surgicals procedures
- Cost must not limit this evolution
  - If you have the robot you have to use it!



The only tool that can make easier the development of minimal invasive surgery in Gynecology

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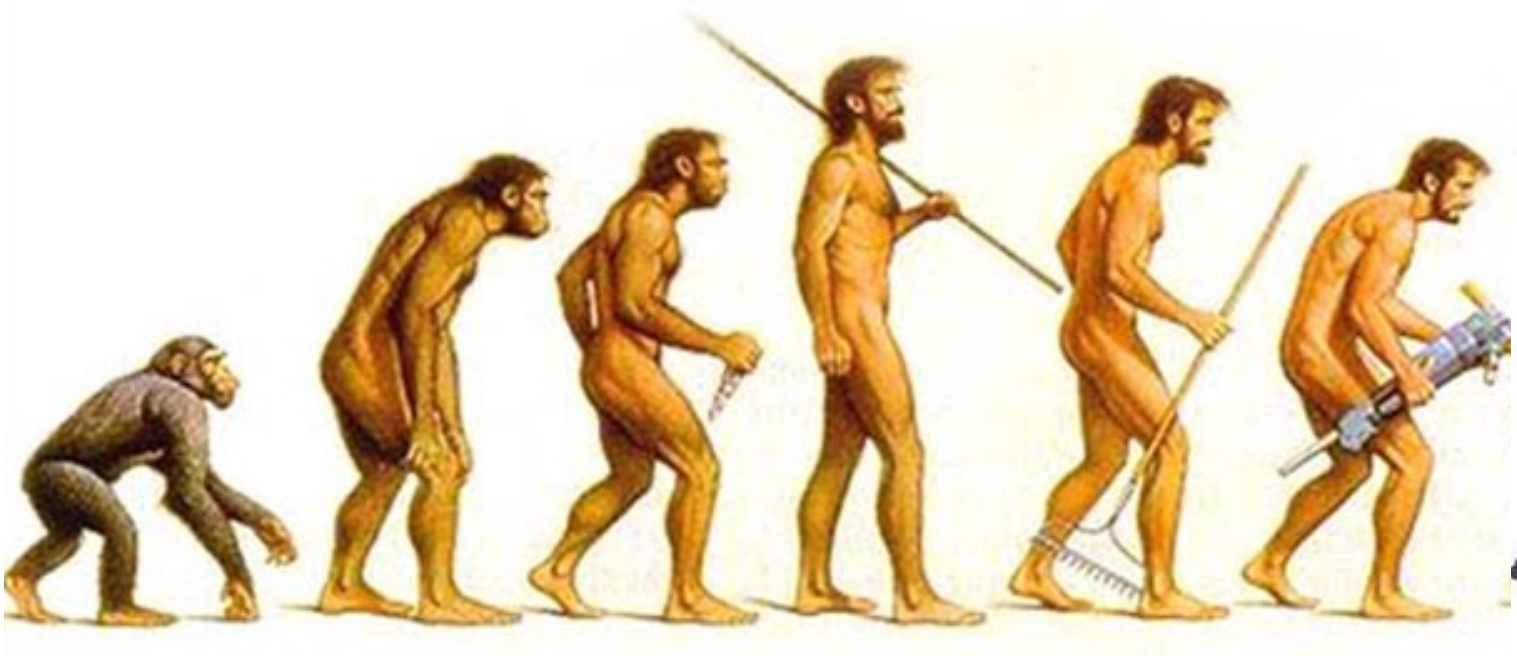
Merci



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