Research group of Computational Imaging & Simulation Technologies in Biomedicine

Detecting abnormal septal motion by combining spatial and electrical information from endocardial mapping data in CRT candidates

O. Camara-Rey[1,2], S. Oeltze[3], M. De Craene[1,2], R. Sebastian[1,2], E. Silva[4], D. Tamborero[4], L. Mont[4], M. Sitges[4], B.H. Bijnens[1,2,5], A.F. Frangi[1,2,5]

[1] Center for Computational Imaging and Simulation Technologies in Biomedicine (CISTIB), Universitat Pompeu Fabra, Barcelona, Spain

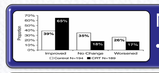
[2] Networking Biomedical Research Center on Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN), Barcelona, Spain

[3] Institute of Simulation and Graphics, Otto-von-Guericke University, Magdeburg, Germany

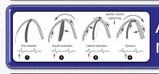
[4] Cardiology Department, Thorax Clinic Institute, Hospital Clínic, Institut d'Investigacions Biomèdiques August Pi i Sunyer, University of Barcelona, Spain

[5] Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain

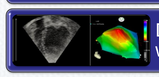
PURPOSE



Need of new patient selection indices for better success rates
- < 30% of non-responders

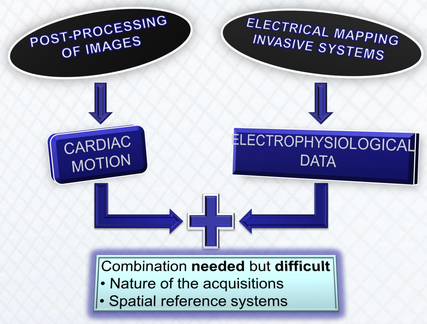


Abnormal, fast, septal motion (septal flash) might show mechanical inefficiency induced by LBBB



Difficult to combine information on local myocardial motion with electrical activation

GOAL: Estimate septal flash motion from endocardial contact mapping data



METHODS

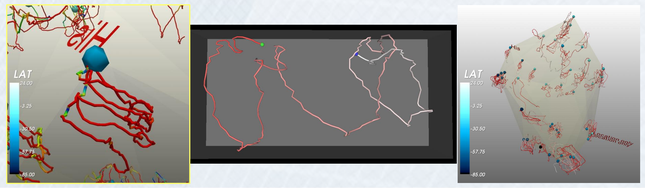
Patient population

- 10 patients showing heart failure
- Candidates for CRT according to standard criteria
- B: baseline; F: 6 months follow-up

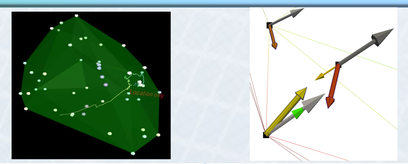
	Age	6MWT B/F[m]	NYHA B/F	EF (B)	ESV B/F	QRS[ms]	VVD[ms]	Clin resp	Vol resp
1	75	276/392	II/I	50.9	118/77	200	0	yes	yes
2	71	224/380	III/II	22.8	164/67	160	0	yes	yes
3	68	204/240	III/III	26.2	213/172	120	0	yes	yes
4	80	176/256	III/II	25.0	205/75	200	0	yes	yes
5	66	416/496	III/I	25.0	340/305	200	-30	yes	yes
6	58	336/496	III/I	27.0	155/175	200	-30	yes	no
7	55	416/416	II/I	24.8	193/198	120	-30	no	no
8	68	245/312	III/II	9.0	260/202	140	-30	yes	yes
9	65	308/364	III/II	26.0	138/75	120	-30	yes	yes
10	55	-/-	III/transp	15.0	174 / -	120	-30	no	no

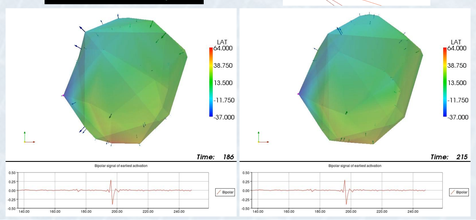
Mapping procedure

- CARTO system (Biosense, Webster)
- Recordings
  - **Catheter position**, orientation (100Hz)
  - Uni-/bipolar ECG, impedance (100Hz)
  - Local Activation Times (1kHz)



Cardiac motion analysis

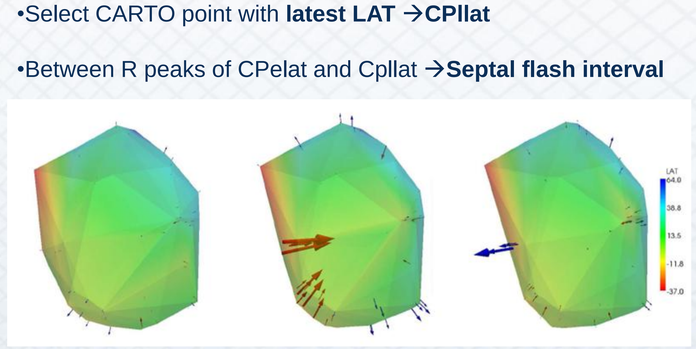


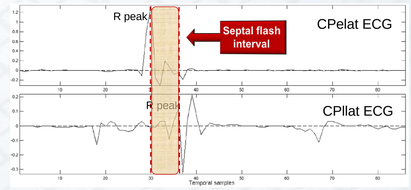


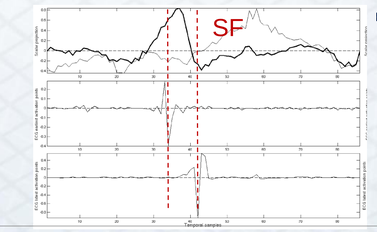
METHODS

Identifying septal flash motion

- Select CARTO point with **earliest LAT** -> **CPelat**
- Select CARTO point with **latest LAT** →**CPllat**
- Between R peaks of CPelat and Cpllat →**Septal flash interval**







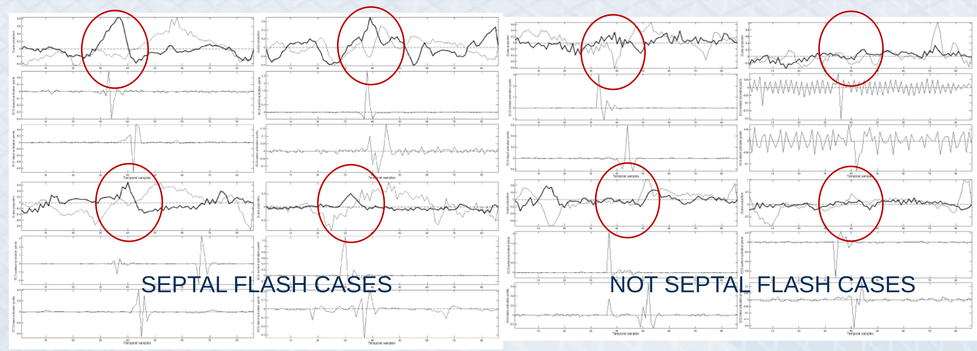
Radial septal (darker) and lateral wall (lighter) displacement

Bipolar signal of earliest activated point

Bipolar signal of latest activated point

RESULTS

- 4 SF cases
- 6 not SF cases
- Confirmed with pre-operative MRI and US



CONCLUSIONS

- First time CARTO data is used for cardiac motion analysis in CRT patients
- Recognition of fast events (e.g. septal flash) due to high acquisition rate

ACKNOWLEDGMENTS

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