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Trends in prognostic factors and outcomes of ovarian cancer patients over a 20-year period (1997-2016): a population-based analysis

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Introduction

Significant effort has been made to improve the poor prognosis of invasive ovarian cancer patients. The objective of this study was to analyse prognostic factors and invasive ovarian cancer patient outcome over time in a population-based setting.

Methods

The Munich Cancer Registry (MCR) is the population based clinical cancer registry of Upper Bavaria and a part of Lower Bavaria (Southern Germany), with a catchment area of 4.9 million inhabitants.

Fig. 1: Catchment area of the Munich Cancer Registry (MCR)

6,984 ovarian cancer patients diagnosed between 1997 and 2016 within the catchment area of the Munich Cancer Registry (MCR) were analysed. Patients diagnosed 1997-2006 and 2007-2016 were compared. Cumulative incidence (CI) was used to calculate time to progression. Survival was analysed using the Kaplan–Meier method (Overall survival, OS), calculation of relative survival (RS), and a Cox proportional hazards model (OS).

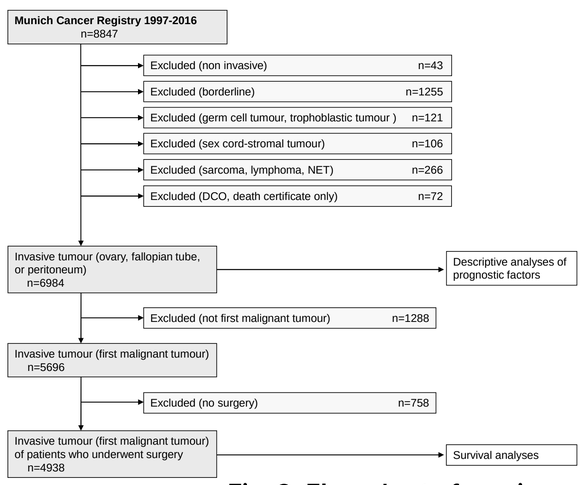

Fig. 2: Flow chart of ovarian cancer patients

Results

Incidence Rate

The incidence rate of invasive ovarian carcinoma decreased over time from 23.7 to 15.6 / 100,000.

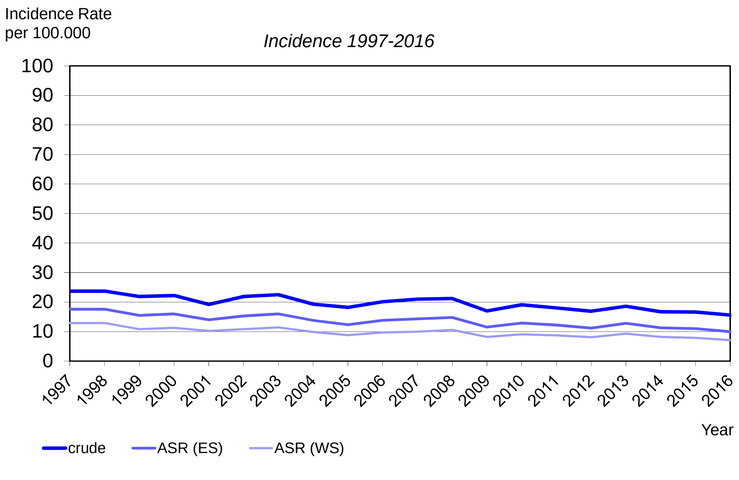

Fig. 3: Ovarian cancer incidence (1997-2016)

Prognostic factors

The majority of the patients continued to be diagnosed at an advanced stage of FIGO III or IV. Furthermore, there was a slight increase in the proportion of patients diagnosed with FIGO III and FIGO IV (Table 1).

Table 1: Patients' and tumour characteristics

	1997-2006 n=2721		2007-2016 n=4263		Total n=6984		p
Age							
Mean / Median	65.3 / 65.9		66.7 / 68.4		66.2 / 67.3		0.046
	n	%	n	%	n	%	<0.001
< 50 y	368	13.5	478	11.2	846	12.1	
50-59 y	496	18.2	763	17.9	1259	18.0	
60-69 y	801	29.4	1110	26.0	1911	27.4	
70-79y	679	25.0	1254	29.4	1933	27.7	
≥ 80 y	377	13.9	658	15.4	1035	14.8	
Grading	n	%	n	%	n	%	<0.001
G1	188	8.1	239	6.5	427	7.1	
G2	772	33.3	805	21.9	1577	26.3	
G3	1362	58.7	2628	71.6	3990	66.6	
Missing / GX	*399*	*14.7*	*591*	*13.9*	*990*	*14.2*	
FIGO	n	%	n	%	n	%	0.045
I	541	23.9	758	21.6	1299	22.5	
II	171	7.6	225	6.4	396	6.9	
III	1028	45.4	1679	47.9	2707	46.9	
IV	523	23.1	843	24.1	1366	23.7	
Missing	*458*	*16.8*	*758*	*17.8*	*1216*	*17.4*	

Treatment

While the proportion of patients that underwent surgery did not change significantly over time, an increase in patients without residual disease was observed (Table 2).

Table 2: Treatment options based on time of diagnosis

	1997-2006 n=2721		2007-2016 n=4263		Total n=6984		p
Therapy	n	%	n	%	n	%	0.249
Surgery	2342	87.0	3678	88.0	6020	87.6	
No surgery	349	13.0	503	12.0	852	12.4	
Missing	*30*	*1.1*	*82*	*1.9*	*112*	*1.6*	
Residual tumour	n	%	n	%	n	%	0.045
no	844	50.2	1633	58.5	2477	55.4	
yes	836	49.8	1159	41.5	1995	44.6	
Missing	*662*	*28.3*	*886*	*24.1*	*1548*	*25.6*	
Chemotherapy	n	%	n	%	n	%	<0.001
yes	1651	70.5	2159	58.7	3810	63.3	
no	691	29.5	1519	41.3	2210	36.7	

Survival analysis

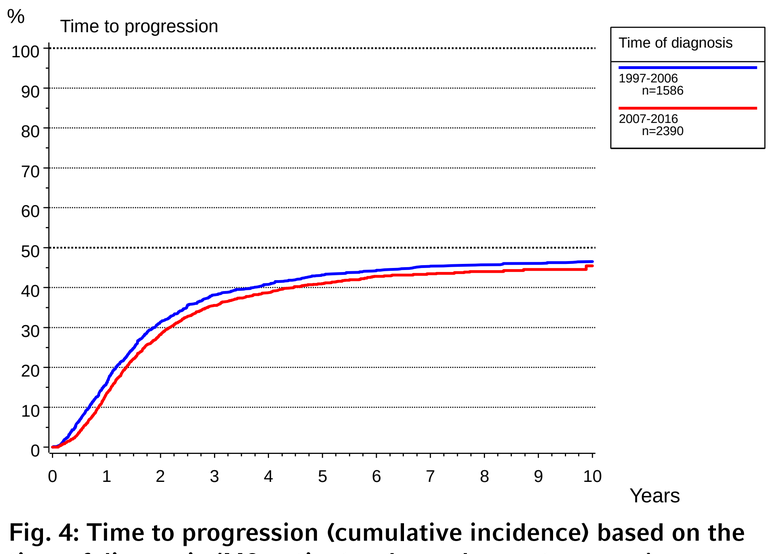

Fig. 4: Time to progression (cumulative incidence) based on the time of diagnosis (M0-patients who underwent surgery)

In patients with surgery, there was a slight improvement in time to progression (5-year CI: 43.2 vs 41.0%, p=0.11), as well as in overall (5-year OS: 41.2 vs 44.8%, p=0.04)) and relative (5-year RS: 44.6 vs 48.4%) survival rates.

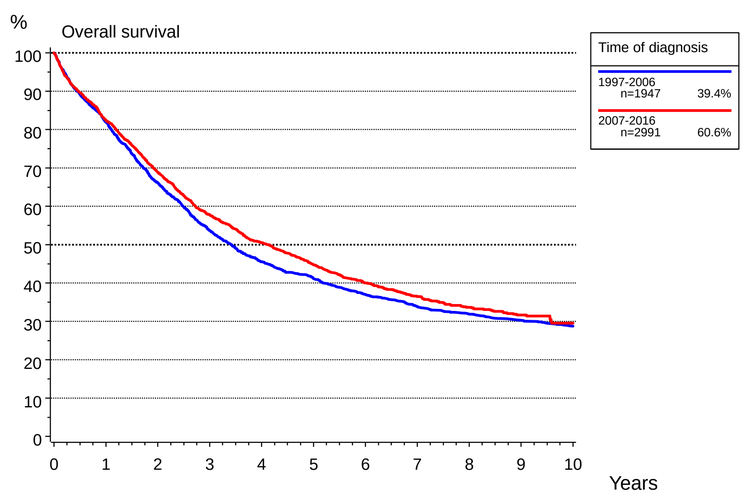

Fig. 5: Overall survival based on the time of diagnosis (patients who underwent surgery)

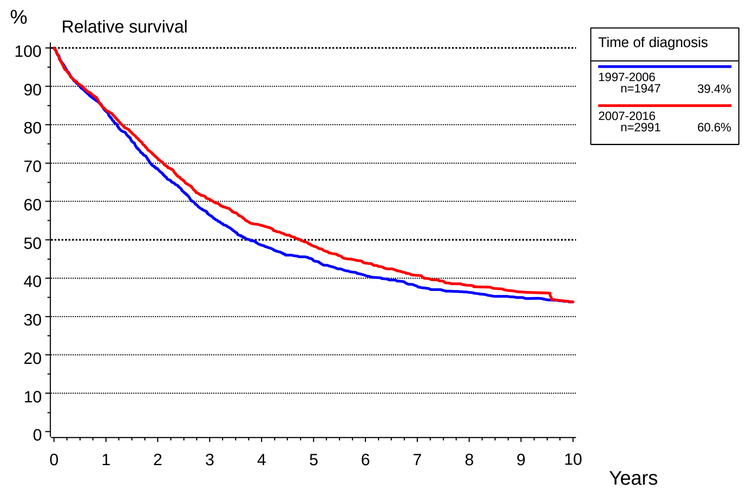

Fig. 6: Relative survival based on the time of diagnosis (patients who underwent surgery)

The cox model revealed a significant association of survival with age (≥80 vs <50 HR 3.78, p<0.001), stage (FIGO IV vs I HR 5.54 p<0.001), residual disease (>1cm vs no residuals HR 2.47, p<0.001), and chemotherapy (no chemo vs chemo HR 1.44, p<0.001).

Table 3: Cox regression model (overall survival) for patients who underwent surgery

Overall survival			
	HR	(95% CI)	p-value
Age			
< 50 y	1.000		<0.001
50-59 y	1.337	(1.148-1.558)	
60-69 y	1.522	(1.322-1.752)	
70-79 y	2.289	(1.990-2.634)	
≥ 80 y	3.782	(3.232-4.425)	
FIGO			
I	1.000		<0.001
II	1.647	(1.324-2.049)	
III	3.519	(3.047-4.064)	
IV	5.544	(4.741-6.481)	
Missing	*3.433*	*(2.917-4.040)*	
Residual tumour			
No residual tumour	1.000		<0.001
≤ 1 cm	1.942	(1.696-2.224)	
> 1 cm	2.474	(2.194-2.790)	
residual tumour nos	2.090	(1.861-2.348)	
n/a	1.795	(1.620-1.989)	
Chemotherapy			
yes	1.000		<0.001
no	1.436	(1.323-1.558)	

Conclusions

Ovarian cancer remains a very challenging disease that needs to be treated with highest standards. Patients undergoing successful treatment, especially with regard to surgery, showed an improvement in survival over time. This may primarily be due to the significant increase in the proportion of patients that underwent surgery without residual disease.

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34. DEUTSCHER KREBSKONGRESS 2020
Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit
Tumorregister München (TRM) Munich Cancer Registry (MCR)
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