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We define quasi-invariant polynomials for an arbitrary finite complex reflection group and study the ring of differential operators on the space of such polynomials using representation theory of complex Cherednik algebras. Our results generalize the main results of Etingof, Ginzburg and the first author about quasi-invariants of Coxeter groups. We prove also some conjectures (of Dunkl and Opdam) concerning the existence of shift operators and the structure of KZ connections in the case of complex reflection groups. (Received February 21, 2005)