Bladder Tumor Staging: Comparison of Contrast-Enhanced and Gray-Scale Ultrasound

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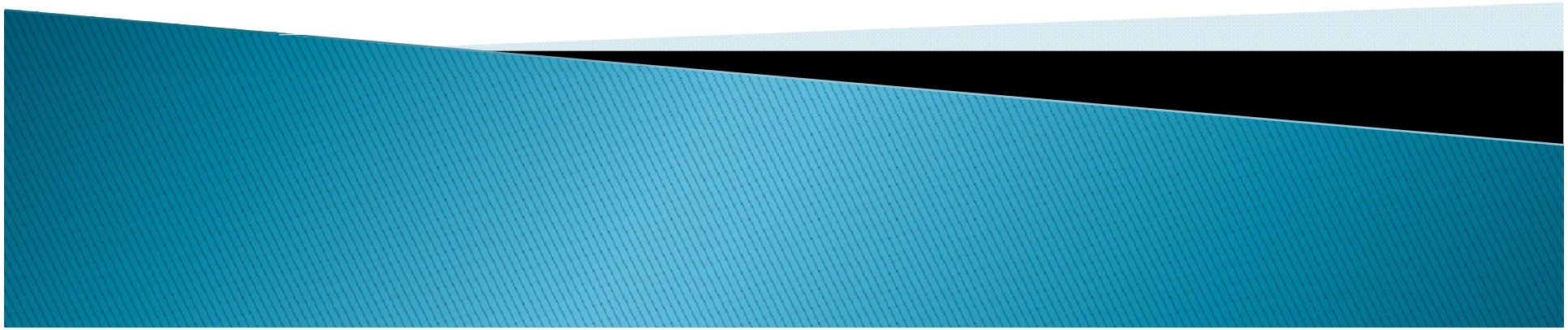
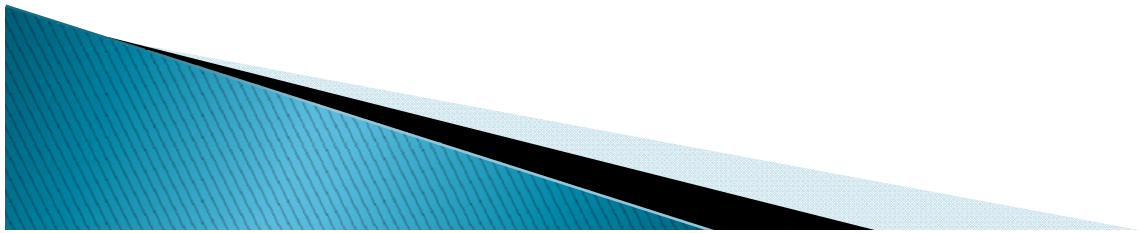


OBJECTIVE

The purpose of this study was to evaluate the effectiveness of contrast-enhanced sonography in comparison with conventional sonography in differentiating muscle-infiltrating and superficial neoplasms of the urinary bladder

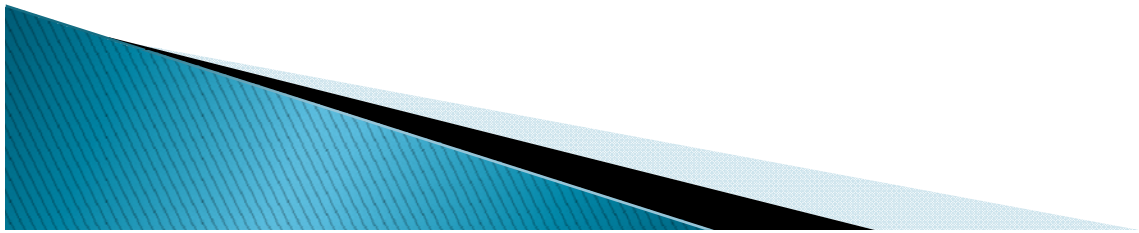


SUBJECTS AND METHODS

Conventional and contrast-enhanced sonography were performed on 34 consecutively registered patients with bladder tumors.
All examinations were reviewed by two independent sonologists.

At **gray-scale sonography**, interruption of the hyperechoic bladder wall was considered the main diagnostic criterion for differentiating superficial and infiltrating tumors.

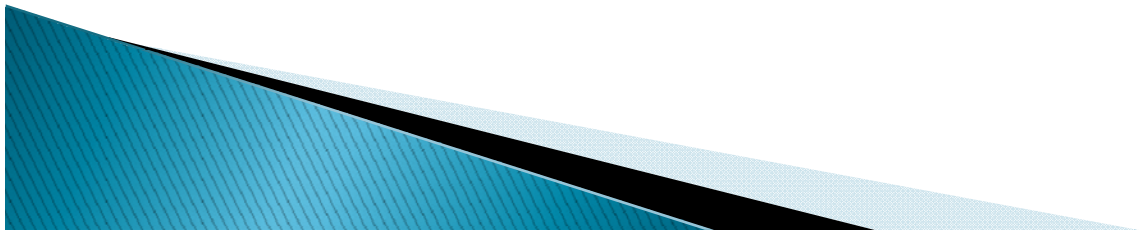
At **contrast-enhanced sonography**, a tumor was considered superficial when the hypoenhancing muscle layer of the bladder wall was intact; disruption of the muscle layer by enhancing tumor tissue was considered diagnostic of infiltration.



SUBJECTS AND METHODS

A level of confidence in the diagnosis of tumor infiltration of the muscle layer was assigned on a 5-degree scale:
1, definitely absent;
2, probably absent;
3, indeterminate;
4,probably present;
5, definitely present.
Scores of 1and 2 indicated negative results (absence of muscle infiltration) and scores of 4 and 5, positive results (presence of muscle infiltration).

Histologic diagnosis was obtained for all patients.



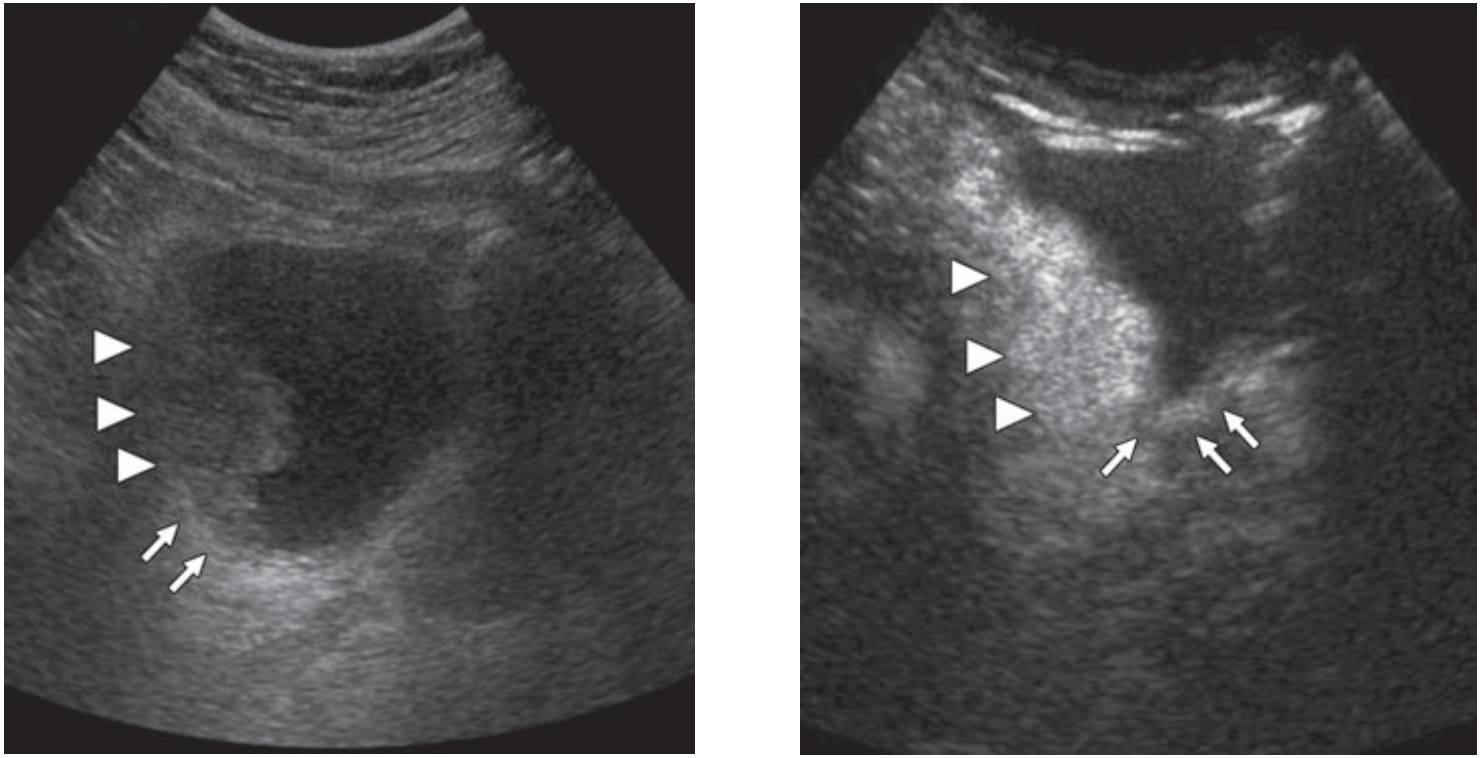
RESULTS

Final pathologic staging revealed 25 superficial tumors (Ta–T1 disease) and nine muscle-infiltrating tumors (> T1).

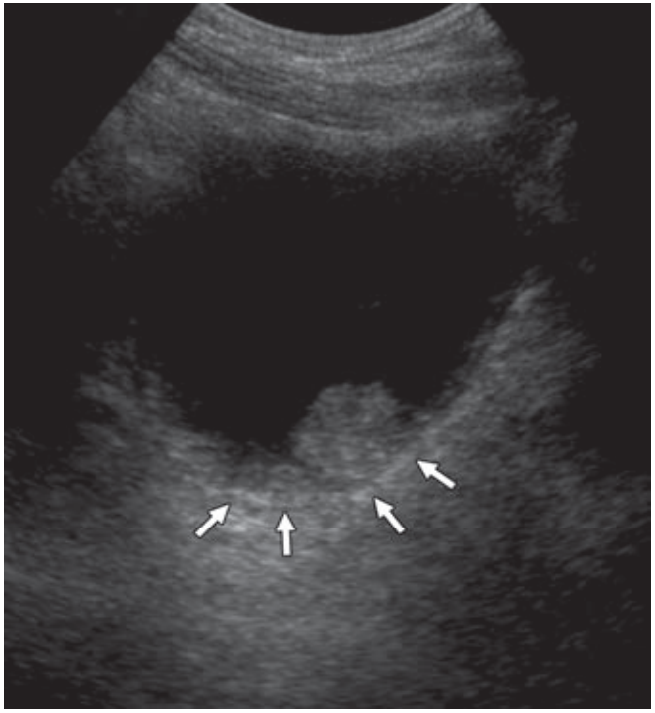
Conventional sonography depicted five of nine muscle-infiltrating tumors, and contrast-enhanced sonography depicted all nine.

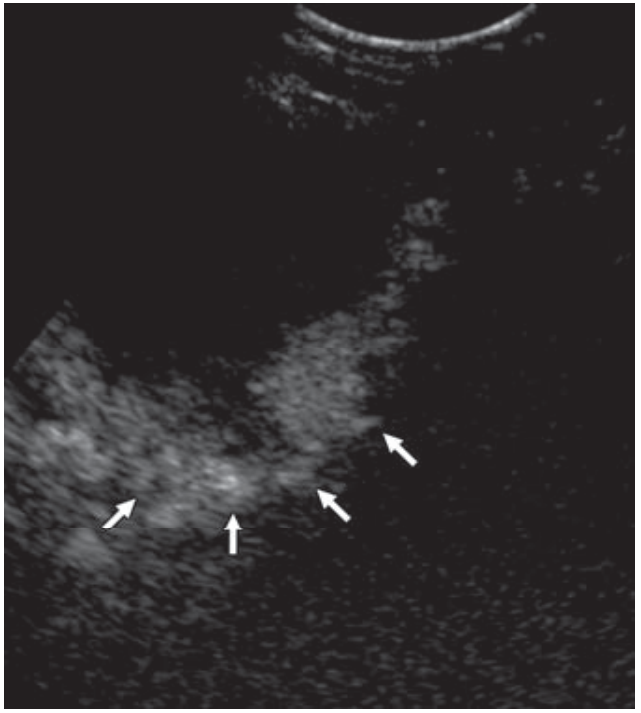
Diagnostic Performance of Gray-Scale and Contrast-Enhanced Sonography in Detection of Infiltration of Muscular Layer of Bladder Wall (*n = 34)*

Diagnosis	Reader 1		Reader 2		Confidence Level	
	Gray-Scale	Contrast-Enhanced	Gray-Scale	Contrast-Enhanced	Level	Explanation
True-Positive	2	9	5	9	4,5	Presence of muscle infiltration at histology
True-Negative	18	21	17	20	1,2	Absence of muscle infiltration at histology
Indeterminated	4	2	3	1	3	Regardless of histologic findings
False-Positive	5	2	6	4	4,5	Absence of muscle infiltration at histology
False-Negative	5	0	3	0	1,2	Presence of muscle infiltration at histology

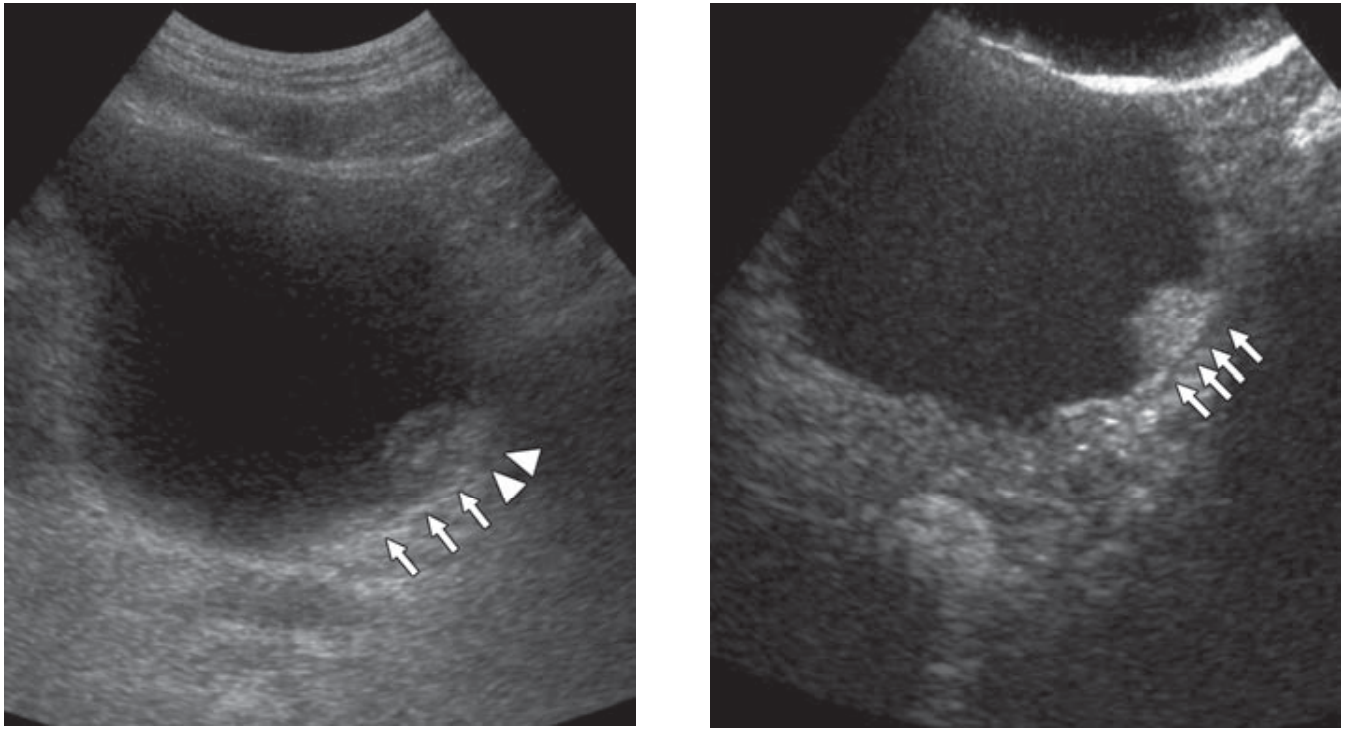


51-year-old man with infiltrating bladder wall tumor correctly staged with gray-scale and contrast enhanced sonography.

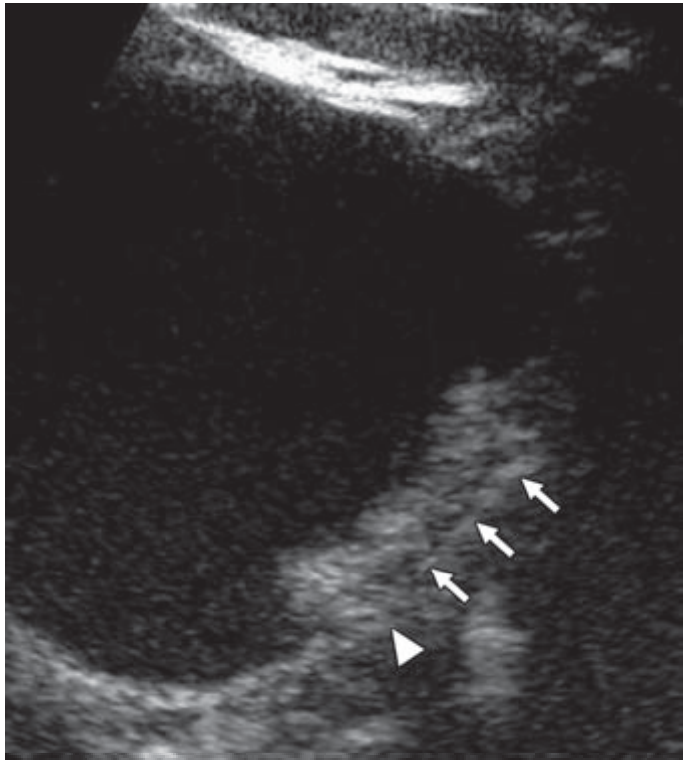




58-year-old man with infiltrating bladder wall tumor understaged with gray-scale ultrasound and correctly staged with contrast-enhanced ultrasound.



63-year-old man with noninfiltrating bladder wall tumor overstaged with gray-scale ultrasound and correctly staged with contrast-enhanced ultrasound.



59-year-old man with noninfiltrating tumor of lateral aspect of bladder wall overstaged at contrast-enhanced sonography. Contrast-enhanced image shows irregular muscle layer in lateral part of tumor (*arrows) that appears interrupted in inner part* (*arrowhead*

CONCLUSION

… Our study showed that contrast-enhanced sonography is better than conventional sonography for differentiating muscle-infiltrating and superficial neoplasms of the urinary bladder.

If our results are confirmed with a larger series of patients, contrast-enhanced sonography may be a new useful, noninvasive, and reproducible diagnostic tool for differentiating superficial bladder tumors from tumors that infiltrate the muscle layer of the bladder wall...